



ROCKWELL INTERNATIONAL
NORTH AMERICAN SPACE OPERATIONS
ROCKY FLATS PLANT

Remedial Investigation Report For 903 Pad, Mound, and East Trenches Areas

Volume VII

U.S. DEPARTMENT OF ENERGY

**Rocky Flats Plant
Golden, Colorado**

31 December 1987

DRAFT

REVIEWED FOR CLASSIFICATION/UCNI

By F. J. Curran

Date 4-1-91

UNITED STATES DEPARTMENT OF ENERGY
ADMINISTRATION CONTRACT DE-AC04-76DPO3533

A-DU02-000

ADMIN RECORD

1987 MONITOR WELLS

EXPLANATION OF SYMBOLS AND TERMS
ON BORING LOGS

SAMPLE TYPE



Split Spoon



NC Core

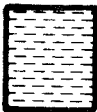


Continuous Drive

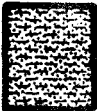


Bulk

GRAPHIC LOG



Clay or Claystone



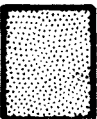
Clayey Sand or Sandy Clay



Silty Claystone



Cobbles and/or Gravel



Sand and Sandstone



Sand and Gravel



Silt or Siltstone

PENETRATION RESISTANCE



Standard Penetration Test Results
Blows Per Inch.

INDEX OF DATA

Boring No.: 9-87BR/BH29-87

Completed as well? Yes

Data in File

- ☒ Log of Borehole
- ☒ Well Construction Summaries
- ☐ Well Development Summaries
- ☒ Hydraulic Conductivity Test Data
and Results
- ☐ Packer Test Data and Results
- ☒ Water Level Data

LOG OF BOREHOLE

Location Rocky Flats Plant; 903 Pad Area
 Coordinates N 36080.84 E 22239.33
 Total Depth 37.50'

Borehole/Well No. 9-87BR/BH29-87
 Ground Surface Elevation 5980.22'
 Water Level Encountered 17.50'
 Static 5963.42' (12/01/87)

Drilling Company Boyles Bros
 Date Drilled June 12, 1987
 Drilling Method Hollow Stem Auger
 Logged By J. B. Bergman
 Geologist

Driller R. Sharp
 Helper T. Merritt
 Drilling Fluid None
 Checked By J. P. Parillo
 Site Manager
Brent Lewis
 CEARP Manager

Comments _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
0			TOPSOIL	
			<u>0.0-1.5' SAMPLE.</u> Recovered 1.45/1.5' = 76%. 0.0 - 0.5': TOP SOIL: grayish brown (5 YR 3/2); abundant roots and grasses; sandy clay and gravel; unconsolidated; dry.	HNu Background=0.6 OVA Background=0.8 No readings over background.
5			ROCKY FLATS ALLUVIUM	
			0.5 - 1.45': COBBLES AND GRAVEL: pink and gray quartzite and granite in a clay matrix; pale yellowish brown (10 YR 6/2); unconsolidated; angular; dry.	<u>0.0-10.0'</u> : Composite sample: BH29870010.
			<u>1.5-3.0' SAMPLE.</u> Recovered 1.65/1.5' = 110%. CLAYEY GRAVEL: pink and gray granite and quartzite in a moderate yellowish brown (10 YR 5/4) matrix; sandy; unconsolidated; unsorted; dry.	<u>5.0'</u> : Field screen readings: HNu = 0.8 (BG); OVA=1.8 (BG).
10			<u>3.0-4.2' SAMPLE.</u> Recovered 1.0/1.2' = 83%. CLAYEY GRAVEL: same as above; dry.	<u>9.70-12.70'</u> : Contact sample: BH298713CT.
			<u>4.2-5.0' SAMPLE.</u> Recovered 1.5/0.8' = 188%. CLAYEY GRAVEL: same as above; dry.	<u>10.0'</u> : Field screen readings: HNu = 0.8 (BG); OVA = 1.8 (BG).
			<u>5.0-6.0'</u> : No recovery. Lost core.	<u>15.0'</u> : Field screen readings: HNu = 0.8 (BG); OVA = 1.8 (BG).
			<u>6.0-7.5' SAMPLE.</u> Recovered 0.6/1.5' = 40%. SILT: pale yellowish brown (10 YR 6/2); quartzite cobble; distorted sample (cuttings from center bit); dry.	<u>15.70-16.80'</u> : Bedrock sample: BH298716BR.
15				<u>17.50-18.50'</u> : Water table sample: BH298717WT.
20				<u>20.0'</u> : Field screen readings: HNu = 0.2 (BG); OVA = 1.8 (BG).

LOG OF BOREHOLE

Location Rocky Flats Plant; 903 Pad Area
Coordinates N 36080.84 E 22239.33
Total Depth 37.50'

Borehole/Well No. 9-87BR/BH29-87
Ground Surface Elevation 5980.22'
Water Level Encountered 17.50'
Static 5963.42' (12/01/87)

Drilling Company Boyles Bros
Date Drilled June 12, 1987
Drilling Method Hollow Stem Auger
Logged By J. B. Bergman
Geologist

Driller R. Sharp
Helper T. Merritt
Drilling Fluid None
Checked By [Signature]
Site Manager

CEARP Manager

Comments

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
20			<u>7.5-9.5' SAMPLE.</u> Recovered 2.0/2.0' = 100%. SAND AND GRAVEL: moderate yellowish brown (10 YR 5/4); abundant quartzite and granite; unconsolidated; medium-grained sand, angular to sub-rounded; dry.	
25			<u>9.5-12.5' SAMPLE.</u> Recovered 2.0/3.0' = 67%. SAND AND GRAVEL: same as above; moist.	<u>25.0'</u> : Field screen readings: HNu = 0.2 (BG); OVA = 1.8 (BG).
			<u>12.5-15.0' SAMPLE.</u> Recovered 2.0/2.5' = 80%. 12.5-12.7': SAND AND GRAVEL: same as above; moist.	
30			<u>ARAPAHOE FORMATION</u> 12.7-13.8': SANDSTONE: light brown (5 YR 6/4); very fine grained; rounded; well sorted; wet. 13.8-14.5': SANDSTONE: pale yellowish brown (10 YR 6/2); quartzose; coarse grained; well sorted; rounded; moist.	<u>30.0'</u> : Field screen readings: HNu = 0.2 (BG); OVA = 1.8 (BG).
35			<u>15.0-17.5' SAMPLE.</u> Recovered 1.8/2.5' = 72%. SANDSTONE: yellowish gray (5 Y 8/1); well sorted; medium grained; consolidated; moist.	<u>35.0'</u> : Field screen readings: HNu = 0.2 (BG); OVA = 1.8 (BG).
40			<u>17.5-20.0' SAMPLE.</u> Recovered 2.0/2.5' = 80%. SANDSTONE: same as above; wet at 17.5'; clay layer olive gray (5 Y 3/2) at 18.0-18.5'; wet.	

LOG
OF
BOREHOLE

Location Rocky Flats Plant; 903 Pad Area
Coordinates N 36080.84 E 22239.33
Total Depth 37.50'

Borehole/Well No. 9-87BR/BH29-87
Ground Surface Elevation 5980.22'
Water Level Encountered 17.50'
Static 5963.42' (12/01/87)

Drilling Company Boyles Bros
Date Drilled June 12, 1987
Drilling Method Hollow Stem Auger
Logged By J. B. Bergman
Geologist

Driller R. Sharp
Helper T. Merritt
Drilling Fluid None
Checked By [Signature]
Site Manager

CEARP Manager

Comments _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			<u>20.0-22.5' SAMPLE.</u> Recovered 1.5/2.5' = 60%. SANDSTONE: pale olive (10 Y 6/2); medium-grained; well sorted; few moder- ate yellowish brown (10 YR 5/4) stains; rounded; wet.	
			<u>22.5-25.0' SAMPLE.</u> Recovered 1.5/2.5' = 60%. SANDSTONE: same as above; wet.	
			<u>25.0-27.5' SAMPLE.</u> Recovered 2.2/2.5' = 88%. SANDSTONE: same as above; wet.	
			<u>27.5-30.0' SAMPLE.</u> Recovered 0/2.5' = 0%.	
			<u>30.0-32.5' SAMPLE.</u> Recovered 2.5/2.5' = 100%. 30.0-30.5': SANDSTONE: same as above. 30.5-31.5': SANDSTONE: moderate brown (5 YR 4/4); chert and quartzite; very coarse-grained; well to moderate sorting; wet. 31.5-31.7': CLAYSTONE: light olive gray (5 Y 5/2); sandy; consolidated, moist. 31.7-31.9': SANDSTONE: light olive gray (5 Y 5/2); and moderate brown (5 YR 4/4); well sorted; wet. 31.9-32.5': CLAYSTONE: light olive gray (5 Y 5/2); sandy; consolidated; moist.	

LOG
OF
BOREHOLE

Location Rocky Flats Plant; 903 Pad Area
Coordinates N 36080.84 E 22239.33
Total Depth 37.50'

Borehole/Well No. 9-87BR/BH29-87
Ground Surface Elevation 5980.22'
Water Level Encountered 17.50'
Static 5963.42' (12/01/87)

Drilling Company Boyles Bros
Date Drilled June 12, 1987
Drilling Method Hollow Stem Auger
Logged By J. B. Bergman
Geologist

Driller R. Sharp
Helper T. Merritt
Drilling Fluid None
Checked By [Signature]
Site Manager

CEARP Manager

Comments _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			<p><u>32.5-35.0' SAMPLE.</u> Recovered 2.8/2.5' = 112%. CLAYSTONE: light brown (5 YR 5/6) and light olive gray (5 Y 5/2); some light brown (5 YR 5/6); mottles; consolidated; trace organics; moist.</p> <p><u>35.0-37.5' SAMPLE.</u> Recovered 2.5/2.5' = 100%. CLAYSTONE: same as above; sandy in top 0.5' and in shoe; moist.</p> <p>TOTAL DEPTH: 37.50'</p>	

WELL COMPLETION INFORMATION

Location Rocky Flats Plant; 903 Pad Area

Well No. 9-87BR

Coordinates N 36080.84 E 22239.33

Elevation: Ground Surface 5980.22'

Total Depth: Well 32.40'

Top of Casing 5981.72'

Borehole 37.50'

Formation of Completion Arapahoe Formation

Casing Material Sch 5, type 316 TFJ stainless steel

Casing Diameter 2" ID

Screen Material 0.010" wire wrap, type 316 TFJ stainless steel

Surface Casing Diameter 5" ID

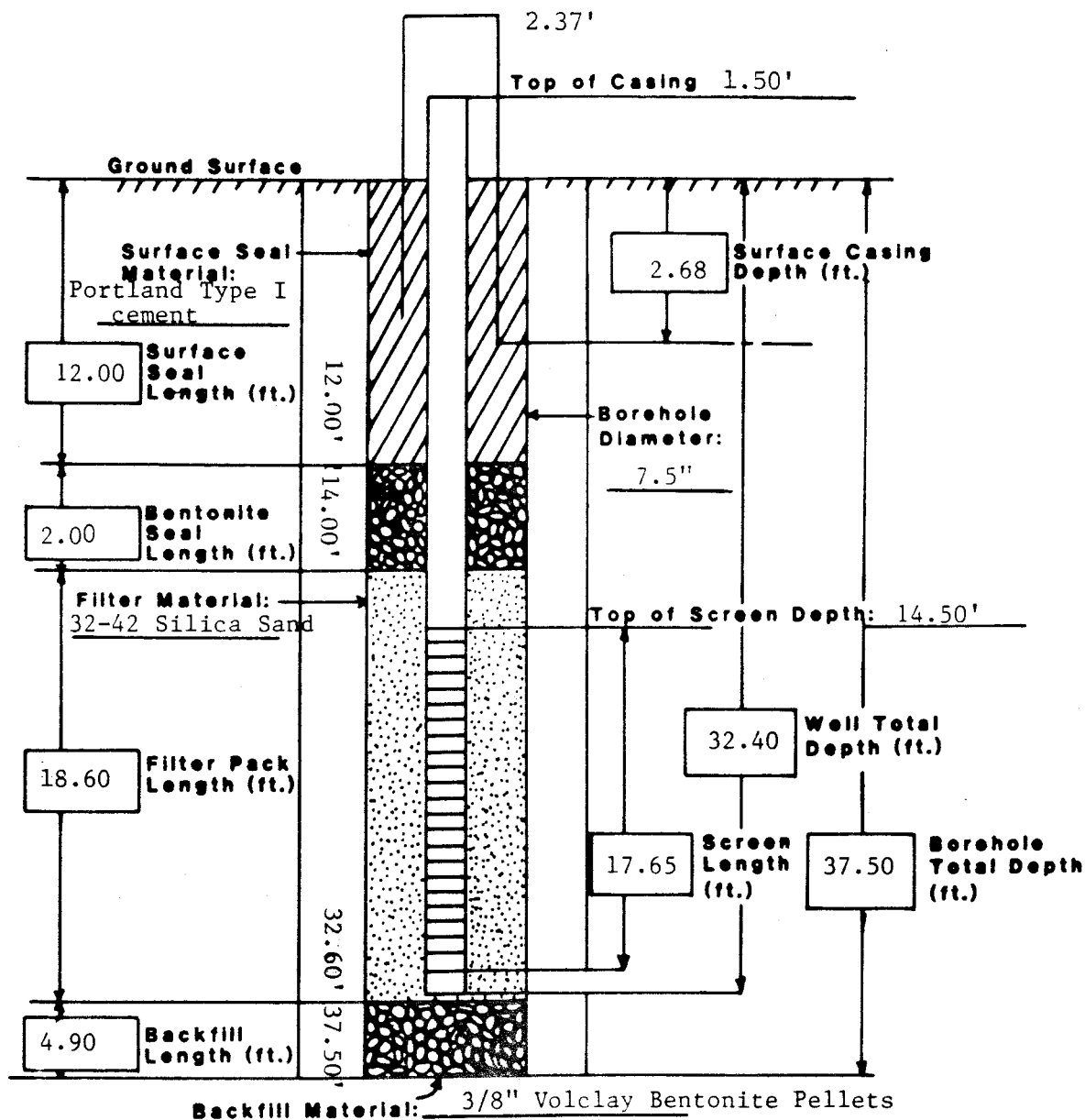
Date Installed June 15, 1987

Approved By [Signature]

Installed By J.B. Bergman
Geologist

[Signature]
Site Manager
[Signature]
CEARP Manager

Comments _____



PROGRAM SLUGT, VERSION 4, OCT. 1985

THIS PROGRAM CALCULATES MEAN TRANSMISSIVITIES FROM SLUG-TEST DATA BASED ON TWO ANALYTICAL APPROACHES:

- (1) METHOD OF COOPER, BREDEHOEFT AND PAPADOPULOS, 1967 (ARTICLE IN VOL.3, NO.1 OF WRR ENTITLED "RESPONSE OF A FINITE DIAMETER WELL TO AN INSTANTANEOUS CHARGE OF WATER")
- (2) METHOD OF BOUMER AND RICE, 1976 (ARTICLE IN VOL. 12, NO.3 OF WRR ENTITLED "A SLUG TEST FOR DETERMINING HYDRAULIC CONDUCTIVITY OF UNCONFINED AQUIFERS WITH COMPLETELY OR PARTIALLY PENETRATING WELLS")

PROJECT NO.: 6-0118-87

CLIENT: Rockwell International

SITE LOCATION: Rocky Flats Plant

DATE OF SLUG TEST: 10-9-87

FIELD INVESTIGATOR: Kevin McNeill

WELL NO.: 9-87 Run #1

INPUT DATA ARE:

INNER CASING DIAMETER = 2.00 INCHES

LENGTH OF SCREEN OR INTAKE PORTION = 15.55 FEET

INNER SCREEN OR OPEN-HOLE DIAMETER = 2.00 INCHES

DEPTH FROM STATIC LEVEL TO BOTTOM OF SCREEN = 15.55 FEET

DIAMETER OF DRILLED HOLE = 7.50 INCHES

THICKNESS OF SATURATED AQUIFER ZONE = 14.90 FEET

ESTIMATED POROSITY OF GRAVEL PACK = .25

FALLING-HEAD INDEX = 0 ("1" IF FALLING, "0" IF RISING)

NUMBER OF HEAD-TIME DATA POINTS = 51

(SEC)	(FEET)
1.00	1.060
2.00	.980
3.00	.910
4.00	.850
5.00	.800
6.00	.750
7.00	.710
8.00	.670
9.00	.640
10.00	.600
11.00	.570
12.00	.540
13.00	.510
14.00	.480
15.00	.460
16.00	.440
17.00	.420
18.00	.400
19.00	.380
20.00	.360
21.00	.340
22.00	.330
23.00	.310
24.00	.300
25.00	.290
26.00	.280
27.00	.260
28.00	.250
29.00	.240
30.00	.230
31.00	.220
32.00	.210
33.00	.210
34.00	.200
35.00	.190
40.00	.160
45.00	.130
50.00	.110
55.00	.090
60.00	.080
65.00	.070
70.00	.060
75.00	.050
80.00	.040
85.00	.040
94.00	.030
104.00	.030
114.00	.020
126.00	.020
146.00	.010
176.00	.010

HO WAS COMPUTED FROM INTERCEPT OF PLOT OF LOG(H) VS. TIME

SUCCESSIVE COMPUTED
VALUES FOR HO
(FEET)

.6760
.7291
.7533

.....

METHOD OF BOUWER AND RICE

COMPUTED RESULTS USING DIAMETER OF DRILLED HOLE:

PERMEABILITY = $1.00\text{E-}04$ FT/sec = $3.05\text{E-}03$ CM/sec

TRANSMISSIVITY = $1.49\text{E-}03$ FT²/sec

COMPUTED RESULTS USING DIAMETER OF CASING AND SCREEN:

PERMEABILITY = $3.22\text{E-}05$ FT/sec = $9.80\text{E-}04$ CM/sec

TRANSMISSIVITY = $4.79\text{E-}04$ FT²/sec

PROGRAM SLUGT, VERSION 4, OCT. 1985

THIS PROGRAM CALCULATES MEAN TRANSMISSIVITIES FROM SLUG-TEST DATA BASED ON TWO ANALYTICAL APPROACHES:

- (1) METHOD OF COOPER, BREDEHOEFT AND PAPADOPULOS, 1967 (ARTICLE IN VOL.3, NO.1 OF WRR ENTITLED "RESPONSE OF A FINITE DIAMETER WELL TO AN INSTANTANEOUS CHARGE OF WATER")
- (2) METHOD OF BOUWER AND RICE, 1976 (ARTICLE IN VOL. 12, NO.3 OF WRR ENTITLED "A SLUG TEST FOR DETERMINING HYDRAULIC CONDUCTIVITY OF UNCONFINED AQUIFERS WITH COMPLETELY OR PARTIALLY PENETRATING WELLS")

PROJECT NO.: 6-0118-87

CLIENT: Rockwell International

TEST LOCATION: Rocky Flats Plant

DATE OF SLUG TEST: 10-9-87

FIELD INVESTIGATOR: Kevin McNeill

WELL NO.: 9-87 Run #2

INPUT DATA ARE:

INNER CASING DIAMETER = 2.00 INCHES

LENGTH OF SCREEN OR INTAKE PORTION = 15.55 FEET

INNER SCREEN OR OPEN-HOLE DIAMETER = 2.00 INCHES

DEPTH FROM STATIC LEVEL TO BOTTOM OF SCREEN = 15.55 FEET

DIAMETER OF DRILLED HOLE = 7.50 INCHES

THICKNESS OF SATURATED AQUIFER ZONE = 14.90 FEET

ESTIMATED POROSITY OF GRAVEL PACK = .25

FALLING-HEAD INDEX = 0 ("1" IF FALLING, "0" IF RISING)

NUMBER OF HEAD-TIME DATA POINTS = 39

TIME (sec)	HEAD (FEET)
1.00	.970
2.00	.910
3.00	.850
4.00	.800
5.00	.750
6.00	.700
7.00	.660
8.00	.630
9.00	.590
10.00	.560
11.00	.530
12.00	.500
13.00	.470
14.00	.450
15.00	.420
16.00	.400
17.00	.380
18.00	.360
19.00	.350
20.00	.330
21.00	.310
22.00	.300
23.00	.290
24.00	.270
25.00	.260
26.00	.250
27.00	.240
28.00	.230
29.00	.220
30.00	.200
35.00	.160
40.00	.130
45.00	.110
50.00	.090
55.00	.070
60.00	.060
70.00	.040
80.00	.020
90.00	.010

H0 WAS COMPUTED FROM INTERCEPT OF PLOT OF LOG(H) VS. TIME

SUCCESSIVE COMPUTED
VALUES FOR H0
(FEET)

.9027
.8865

METHOD OF BOUWER AND RICE

COMPUTED RESULTS USING DIAMETER OF DRILLED HOLE:

PERMEABILITY = $1.37\text{E-}04$ FT/sec = $4.17\text{E-}03$ CM/sec

TRANSMISSIVITY = $2.04\text{E-}03$ FT**2/sec

COMPUTED RESULTS USING DIAMETER OF CASING AND SCREEN:

PERMEABILITY = $4.39\text{E-}05$ FT/sec = $1.34\text{E-}03$ CM/sec

TRANSMISSIVITY = $6.55\text{E-}04$ FT**2/sec

PROGRAM SLUGT, VERSION 4.OCT. 1985

THIS PROGRAM CALCULATES MEAN TRANSMISSIVITIES FROM SLUG-TEST DATA BASED ON TWO ANALYTICAL APPROACHES:

- (1) METHOD OF COOPER, BREDEHOEFT AND PAPADOPULOS, 1967 (ARTICLE IN VOL.3, NO.1 OF WRR ENTITLED "RESPONSE OF A FINITE DIAMETER WELL TO AN INSTANTANEOUS CHARGE OF WATER")
- (2) METHOD OF BOWEN AND RICE, 1976 (ARTICLE IN VOL. 12, NO.3 OF WRR ENTITLED "A SLUG TEST FOR DETERMINING HYDRAULIC CONDUCTIVITY OF UNCONFINED AQUIFERS WITH COMPLETELY OR PARTIALLY PENETRATING WELLS")

PROJECT NO.: 6-0118-87

CLIENT: Rockwell International

ITE LOCATION: Rocky Flats Plant

DATE OF SLUG TEST: 10-9-87

FIELD INVESTIGATOR: Kevin McNeill

WELL NO.: 9-87 Run #1

INPUT DATA ARE:

INNER CASING DIAMETER = 2.00 INCHES

LENGTH OF SCREEN OR INTAKE PORTION = 15.55 FEET

INNER SCREEN OR OPEN-HOLE DIAMETER = 2.00 INCHES

DEPTH FROM STATIC LEVEL TO BOTTOM OF SCREEN = 15.55 FEET

DIAMETER OF DRILLED HOLE = 7.50 INCHES

THICKNESS OF SATURATED AQUIFER ZONE = 14.90 FEET

ESTIMATED POROSITY OF GRAVEL PACK = .25

FALLING-HEAD INDEX = 0 ('1' IF FALLING, '0' IF RISING)

NUMBER OF HEAD-TIME DATA POINTS = 50

TIME (sec)	HEAD (FEET)
1.00	1.030
2.00	.960
3.00	.900
4.00	.840
5.00	.790
6.00	.750
7.00	.710
8.00	.670
9.00	.630
10.00	.600
11.00	.560
12.00	.540
13.00	.510
14.00	.480
15.00	.460
16.00	.440
17.00	.420
18.00	.400
19.00	.380
20.00	.360
21.00	.350
22.00	.330
23.00	.320
24.00	.300
25.00	.290
26.00	.280
27.00	.270
28.00	.260
29.00	.250
30.00	.240
31.00	.230
32.00	.220
33.00	.210
34.00	.200
35.00	.200
40.00	.160
45.00	.140
50.00	.120
55.00	.100
60.00	.090
70.00	.070
80.00	.050
91.00	.050
111.00	.030
135.00	.030
155.00	.020
175.00	.020
205.00	.020
235.00	.010
250.00	.010

HO WAS COMPUTED FROM INTERCEPT OF PLOT OF LOG(H) VS. TIME

SUCCESSIVE COMPUTED
VALUES FOR HO
(FEET)

.5264
.5471

METHOD OF BOWEN AND RICE

COMPUTED RESULTS USING DIAMETER OF DRILLED HOLE:

PERMEABILITY = $6.00\text{E-}05$ FT/sec = $1.83\text{E-}03$ CM/sec

TRANSMISSIVITY = $8.94\text{E-}04$ FT**2/sec

COMPUTED RESULTS USING DIAMETER OF CASING AND SCREEN:

PERMEABILITY = $1.93\text{E-}05$ FT/sec = $5.88\text{E-}04$ CM/sec

TRANSMISSIVITY = $2.87\text{E-}04$ FT**2/sec

12/11/87

Water Level Data
for
Rockwell (Rocky Flats)

<u>Date Measured</u>	<u>Depth to Water from TOC</u>	<u>Elevation TOC (ft)</u>	<u>Water Level Elev. (ft)</u>
--------------------------	------------------------------------	-------------------------------	-----------------------------------

** Well Number: 0987BR

08/04/87	17.50	5981.72	5964.22
12/01/87	18.30	5981.72	5963.42

INDEX OF DATA

Boring No.: 10-87

Completed as well? Yes

Data in File

- ☒ Log of Borehole
- ☒ Well Construction Summaries
- ☐ Well Development Summaries
- ☐ Hydraulic Conductivity Test Data
and Results
- ☐ Packer Test Data and Results
- ☒ Water Level Data

LOG OF BOREHOLE

Location Rocky Flats Plant; 903 Pad Area
Coordinates N 35959.99 E 22180.04
Total Depth 17.00'

Borehole/Well No. 10-87
Ground Surface Elevation 5981.96'
Water Level Encountered None
Static 5970.68'

Drilling Company Boyles Bros
Date Drilled June 15, 1987
Drilling Method Hollow Stem Auger
Logged By C. J. Wood
Geologist

Driller D. Jarvie
Helper K. Parker
Drilling Fluid None
Checked By J. Pasche
Site Manager
Brent Lewis
GEARP Manager

Comments _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
ROCKY FLATS ALLUVIUM				
0			<u>0.0-2.0' SAMPLE.</u> Recovered 1.0/2.0' = 50%. SANDY CLAY: moderate brown (5 YR 4/4); numerous quartzite pebbles and cobbles; some roots; dry.	HNu Background=0.0 OVA Background=0.0 Ludlum Background = 0.0 No readings over background.
5			<u>2.0-4.0' SAMPLE.</u> Recovered 0.6/2.0' = 30%. GRAVELS: quartzite pebbles and cobbles; dry.	
			<u>4.0-5.0' SAMPLE.</u> No recovery. Lost core.	
10			<u>5.0-7.0' SAMPLE.</u> Recovered 2.0/2.0' = 100%. SANDY CLAY: light olive gray (5 Y 6/1) to moderate reddish orange (10 R 6/6); highly weathered; calcite throughout; numerous quartzite pebbles and cobbles; unconsolidated; damp.	
15			<u>7.0-9.0' SAMPLE.</u> Recovered 2.0/2.0' = 100%. SAND: light gray (N 7/0) to moderate reddish orange (10 R 6/6); with some clay; numerous quartzite pebbles subangular to subrounded; caliche throughout; damp to dry.	
20				

LOG
OF
BOREHOLE

Location Rocky Flats Plant; 903 Pad Area
Coordinates N 35259.99 E 22180.04
Total Depth 17.00'

Borehole/Well No. 10-87
Ground Surface Elevation 5981.96'
Water Level Encountered None
Static 5970.68'

Drilling Company Boyles Bros
Date Drilled June 15, 1987
Drilling Method Hollow Stem Auger
Logged By C. J. Wood
Geologist

Driller D. Jarvie
Helper K. Parker
Drilling Fluid None
Checked By J. Pasche
Site Manager
CEARP Manager

Comments _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			<u>9.0-11.0' SAMPLE.</u> Recovered 1.5/2.0' = 75%. 9.0-10.5': SAND: moderate reddish orange (10 R 6/6); weathered; numerous quartzite pebbles; medium to coarse grained; trace caliche; damp.	
			<u>ARAPAHOE FORMATION</u>	
			<u>11.0-13.0' SAMPLE.</u> Recovered 2.0/2.0' = 100%. SILTY CLAYSTONE: moderate reddish orange (10 R 6/6); iron staining; light gray (N 7/0) in areas; damp to dry.	
			<u>13.0-15.0' SAMPLE.</u> Recovered 2.0/2.0' = 100%. SANDY-SILTY CLAYSTONE: moderate reddish orange (10 R 6/6); iron staining; light gray areas (N 7/0); damp.	
			<u>15.0-17.0' SAMPLE.</u> Recovered 2.0/2.0' = 100%. SANDY-SILTY CLAYSTONE: light gray (N 7/0) to moderate reddish orange (10 R 6/6); trace calcite; dry to damp.	
			TOTAL DEPTH: 17.00'	

WELL COMPLETION INFORMATION

Location Rocky Flats Plant; 903 Pad Area

Well No. 10-87

Coordinates N 35959.99 E 22180.04

Elevation: Ground Surface 5981.96'

Total Depth: Well 12.00'

Top of Casing 5983.53'

Borehole 17.00'

Formation of Completion Rocky Flats Alluvium

Casing Material Sch 5, type 316 TFI stainless steel

Casing Diameter 2" ID

Screen Material 0.010" wire wrap, type 316 TFI stainless steel

Surface Casing Diameter 5" ID

Date Installed June 15, 1987

Approved By [Signature]

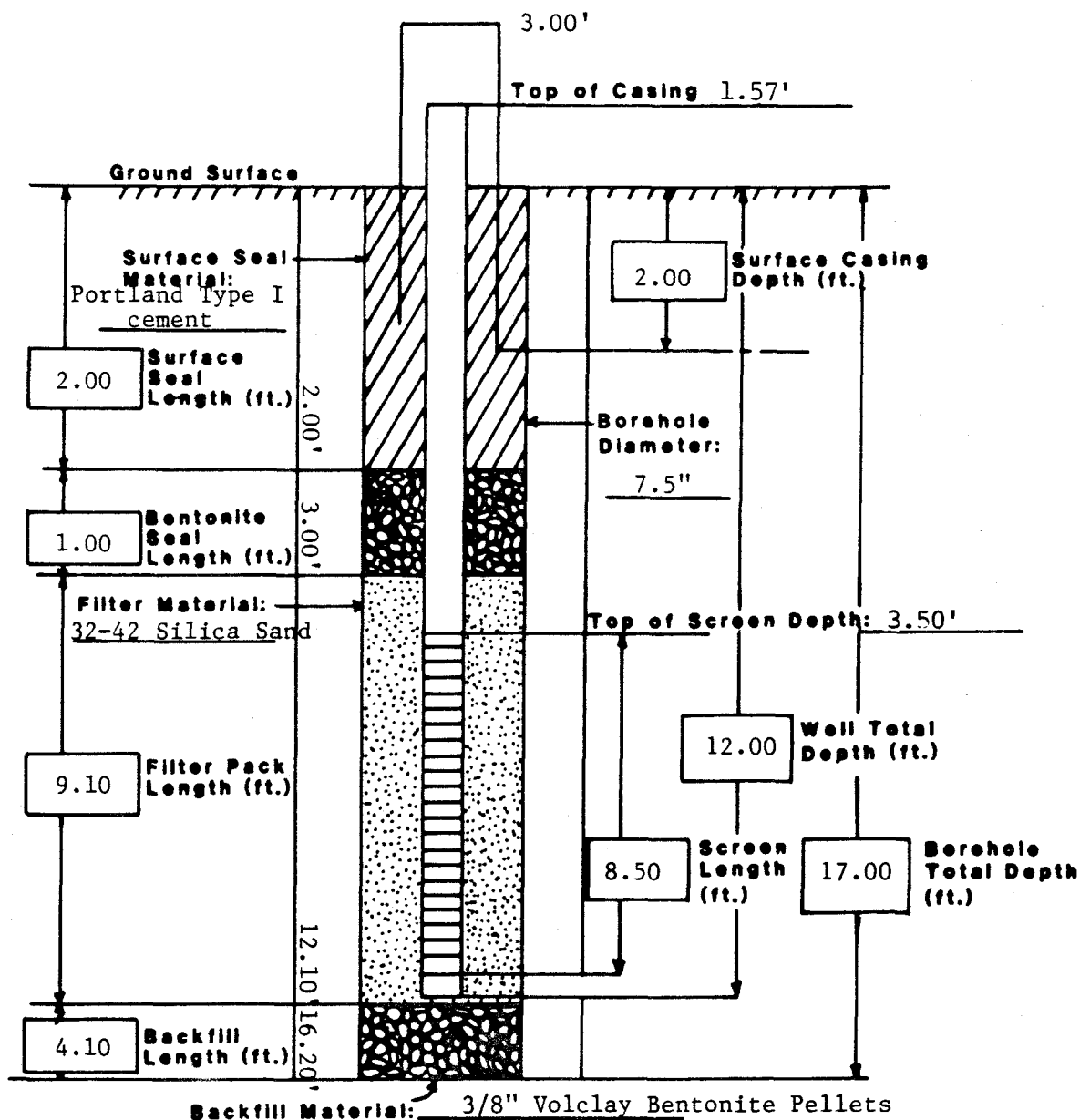
Installed By C.J. Wood

Geologist

Site Manager

GEARP Manager

Comments Centralizer at 7.35 to 8.50'



12/11/87

Water Level Data
for
Rockwell (Rocky Flats)

<u>Date Measured</u>	<u>Depth to Water from TOC</u>	<u>Elevation TOC (ft)</u>	<u>Water Level Elev. (ft)</u>
--------------------------	------------------------------------	-------------------------------	-----------------------------------

** Well Number: 1087

08/04/87	-1.00	5983.53	
12.01/87	12.85	5983.53	5970.68

INDEX OF DATA

Boring No.: 10-87BRA

Completed as well? No

Data in File

- ☒ Log of Borehole
- ☐ Well Construction Summaries
- ☐ Well Development Summaries
- ☐ Hydraulic Conductivity Test Data
and Results
- ☐ Packer Test Data and Results
- ☐ Water Level Data

LOG OF BOREHOLE

Location Rocky Flats Plant; 903 Pad Area

Coordinates

Total Depth 53.00'

Drilling Company Boyles Bros

Date Drilled June 12, 1987

Drilling Method Hollow Stem Auger

Logged By C. J. Wood
Geologist

Borehole/Well No. 10-87BBA

Ground Surface Elevation

Water Level Encountered 28.30'

Static N/A

Driller D. Jarvie

Helper K. Parker

Drilling Fluid None

Checked By J. Pasche

Site Manager

SEARP Manager

Comments Borehole backfilled with Portland Type I cement

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
0			ROCKY FLATS ALLUVIUM	
			<u>0-2.0' SAMPLE.</u> Recovered 1.2/2.0' = 60%. SANDY CLAY: dusky brown (5 YR 2/2); some quartzite pebbles and cobbles; some caliche throughout; damp.	HNu Background=0.0 OVA Background=0.0 Ludlum Background = 0.0. No readings over background.
5			<u>2.0-4.0' SAMPLE.</u> Recovered 2.0/2.0' = 100%. SANDY GRAVELS: moderate brown (5 YR 3/4); some clay; some quartzite peb- bles; trace caliche; very unconsolidated; subangular to subrounded.	
10			<u>4.0-8.0' SAMPLE.</u> Recovered 0.8/4.0' = 20%. SANDY GRAVELS: moderate brown (5 YR 4/4); some clay; some quartzite peb- bles and cobbles; trace caliche; damp.	
15			<u>8.0-10.0' SAMPLE.</u> Recovered 2.3/2.0' = 115%. SAND: moderate reddish brown (10 R 4/6); some caliche; some clay; trace iron staining, moderate reddish orange (10 R 6/6); damp.	
20			<u>10.0-13.0' SAMPLE.</u> Recovered 0.4/3.0' = 130%. SAND: moderate reddish brown (10 R 4/6); some clay; some caliche; trace mod- erate reddish orange (10 R 6/6) iron stains; damp.	

LOG
OF
BOREHOLE

Location Rocky Flats Plant; 903 Pad Area

Coordinates

Total Depth 53.00'

Drilling Company Boyles Bros

Date Drilled June 12, 1987

Drilling Method Hollow Stem Auger

Logged By C. J. Wood
Geologist

Borehole/Well No. 10-87BBA

Ground Surface Elevation

Water Level Encountered 28.30'

Static N/A

Driller D. Jarvie

Helper K. Parker

Drilling Fluid None

Checked By *[Signature]*
Site Manager

CEARP Manager

Comments Borehole backfilled with Portland Type I cement

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
20			<p><u>13.0-16.0' SAMPLE.</u> Recovered 1.2/3.0' = 40%. SANDY CLAY: light olive gray (5 Y 6/1) with moderate reddish orange (10 R 6/6) iron stains; some quartzite cobbles; damp.</p> <p style="text-align: center;"><u>ARAPAHOE FORMATION</u></p>	
25			<p><u>16.0-18.3' SAMPLE.</u> Recovered 2.8/2.3' = 121%. CLAYSTONE: dark yellowish orange (10 YR 6/6); iron staining streaks of moderate reddish orange (10 R 6/6).</p>	
30			<p><u>18.3-20.8' SAMPLE.</u> Recovered 3.0/2.5' = 120%. CLAYSTONE: olive gray (5 Y 3/2) with moderate reddish orange (10 R 6/6) streaks; sandy; slightly damp.</p>	
35			<p><u>20.8-23.3' SAMPLE.</u> Recovered 2.0/2.5' = 80%. CLAYSTONE: dark yellowish orange (10 YR 6/6); weathered; iron staining; moderate reddish orange (10 R 6/6).</p> <p><u>23.3-28.3' SAMPLE.</u> Recovered 2.0/5.0' = 40%. CLAYSTONE: medium gray (N 6/0); slightly sandy; weathered; moderate reddish orange (10 R 6/6) iron stains; damp.</p>	
40			<p><u>28.3-30.3' SAMPLE.</u> Recovered 0.9/2.0' = 45%. CLAYSTONE: medium gray (N 6/0) to olive gray (5 Y 3/2) with moderate reddish orange (10 R 6/6) iron staining streaks; wet.</p>	

LOG
OF
BOREHOLE

Location Rocky Flats Plant; 903 Pad Area

Coordinates _____

Total Depth 53.00'

Drilling Company Boyles Bros

Date Drilled June 12, 1987

Drilling Method Hollow Stem Auger

Logged By C. J. Wood
Geologist

Borehole/Well No. 10-87BBA

Ground Surface Elevation _____

Water Level Encountered 28.30'

Static N/A

Driller D. Jarvie

Helper K. Parker

Drilling Fluid None

Checked By J. Pasche
Site Manager

CEARP Manager

Comments Borehole backfilled with Portland Type I cement

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
40			TOTAL DEPTH WITH PLOPPER: 31.0'; READJUST DEPTH.	
			<u>31.0-36.0' SAMPLE.</u> Recovered 4.0/5.0' = 80%. CLAYSTONE: light brown (5 Y 5/6) to very light gray (N 8/0); weathered; iron staining moderate reddish orange (10 R 6/6); wet.	
45			<u>36.0-40.0' SAMPLE.</u> Recovered 1.7/4.0' = 42%. CLAYSTONE: moderate brown (5 YR 4/4); some iron staining moderate reddish orange (10 R 6/6); wet.	
			<u>40.0-44.0' SAMPLE.</u> Recovered 5.0/4.0' = 125%. CLAYSTONE: same as above.	
50			<u>44.0-48.0' SAMPLE.</u> Recovered 2.0/4.0' = 50%. CLAYSTONE: light brown (5 YR 5/6); wea- thered; with iron staining streak, moderate reddish orange (10 R 6/6); wet.	
			<u>48.0-50.4' SAMPLE.</u> Recovered 2.0/2.4' = 83%. CLAYSTONE: dark gray (N 3/0); moist.	
55			<u>50.6-53.0' SAMPLE.</u> CLAYSTONE: dark gray (N 3/0) ; small lignite layer (coal) about 1/8" thick; moist to wet.	
			TOTAL DEPTH: 53.00'	

INDEX OF DATA

Boring No.: 11-87BR

Completed as well? Yes

Data in File

- ☒ Log of Borehole
- ☒ Well Construction Summaries
- ☐ Well Development Summaries
- ☐ Hydraulic Conductivity Test Data
and Results
- ☐ Packer Test Data and Results
- ☒ Water Level Data

LOG OF BOREHOLE

Location Rocky Flats Plant; 903 Pad Area
Coordinates N 35419.39 E 22989.24
Total Depth 30.00'

Borehole/Well No. 11-87BR
Ground Surface Elevation 5913.57'
Water Level Encountered 2.0'
Static 5896.76' (12/01/87)

Drilling Company Boyles Bros
Date Drilled July 29, 1987
Drilling Method Hollow Stem Auger
Logged By J.B. Bergman
Geologist

Driller T. Merritt
Helper T. High
Drilling Fluid None
Checked By J. Pasolha
Brent Lewis
Site Manager
CEARP Manager

Comments _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
0			<u>COLLUVIUM</u>	
			<u>0.0-2.0' SAMPLE.</u> Recovered 2.0/2.0' = 100%. 0.0-0.5': SANDY GRAVEL TOPSOIL: dark yellowish brown (10 YR 4/2); abundant quartzite pebbles; angular; abundant roots and grasses; unconsolidated; moist. 0.5-2.0': CLAY: dark yellowish brown (10 YR 4/2); abundant caliche; reacts strongly with HCl; few moderate brown (5 YR 4/4) stains; some quartzite pebbles; moist.	No HNu, OVA or Ludlum (Alpha) readings taken.
5			<u>2.0-4.0' SAMPLE.</u> Recovered 2.0/2.0' = 100%. CLAY: grayish orange (10 YR 7/4); abundant caliche; abundant dark yellowish orange (10 YR 6/6) mottles; common quartzite pebbles; ribbons; moist to wet.	
10			<u>4.0-7.0' SAMPLE.</u> Recovered 3.4/3.0' = 113%. 4.0-5.2': CLAY; moderate yellowish brown (10 YR 5/4); abundant caliche; reacts strongly with HCl; common quartzite pebbles; some light olive brown (5 Y 5/6) mottles; friable; dry.	
15			<u>ARAPAHOE FORMATION</u>	
			5.2-7.0': CLAYSTONE: moderate yellowish brown (10 YR 5/4); common light brown (5 YR 5/6) mottles; friable; some caliche; dry.	
20				

LOG
OF
BOREHOLE

Location Rocky Flats Plant; 903 Pad Area
Coordinates N 35419.39 E 22989.24
Total Depth 30.00'

Borehole/Well No. 11-87BR
Ground Surface Elevation 5913.57'
Water Level Encountered 2.0'
Static 5896.76' (12/01/87)

Drilling Company Boyles Bros
Date Drilled July 29, 1987
Drilling Method Hollow Stem Auger
Logged By J.B. Bergman
Geologist

Driller T. Merritt
Helper T. High
Drilling Fluid None
Checked By [Signature]
Site Manager

CEARP Manager

Comments

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
20			<u>7.0-10.0' SAMPLE.</u> Recovered 3.0/3.0' = 100%. CLAYSTONE: same as above; brittle; dry.	
25			<u>10.0-12.0' SAMPLE.</u> Recovered 2.0/2.0' = 100%. 10.0-11.0': CLAYSTONE: same as above with light brown (5 YR 5/6) FeO nodules at 10.7-10.8'; friable; dry. 11.0-12.0': INTERBEDDED CLAYSTONE AND SANDSTONE: moderate brown (5 YR 4/4); alternating layers; claystone 0.2- 0.4' thick; sandstone 0.2-0.4' thick; very fine-grained, well sorted, rounded, moist sandstone; Claystone is moderate yellow- ish brown (10 YR 5/4) with abundant light brown (5 YR 5/6) stains; dense; weathered; moist.	
30			<u>12.0-15.0' SAMPLE.</u> Recovered 2.5/3.0' = 83%. CLAYSTONE: moderate brown (5 YR 4/4); abundant sand patches; abundant FeO stains and nodules; moderate brown (5 YR 4/4) and light brown (5 YR 5/6); last 2" are a very pale orange (10 YR 8/2) sandstone; very fine-grained; some clay; dry.	
			<u>15.0-17.0' SAMPLE.</u> Recovered 2.6/2.0' = 130%. 15.0-15.2': CLAYSTONE: same as above; dry. 15.2-17.0': SANDSTONE: pale red (5 R 6/2); very fine-grained; wet at top; well sorted; rounded; moderate yellowish brown (10 YR 5/4) clay; layers at 16.7 and 16.9'; moist.	

LOG
OF
BOREHOLE

Location Rocky Flats Plant; 903 Pad Area
Coordinates N 35419.39 E 22989.24
Total Depth 30.00'

Borehole/Well No. 11-87BR
Ground Surface Elevation 5913.57'
Water Level Encountered 2.0'
Static 5896.76' (12/01/87)

Drilling Company Boyles Bros
Date Drilled July 29, 1987
Drilling Method Hollow Stem Auger
Logged By J.B. Bergman
Geologist

Driller T. Merritt
Helper T. High
Drilling Fluid None
Checked By [Signature]
Site Manager

CEARP Manager

Comments _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			<u>17.0-20.0' SAMPLE.</u> Recovered 3.0/3.0' = 100%. 17.0-18.2': CLAYSTONE: dark yellowish brown (10 YR 4/2); consolidated; abundant patches of very fine-grained, silty sand; abundant; dark yellowish orange (10 YR 6/6) stains; moist. 18.2-20.0': SANDSTONE: medium light gray (N 6/0); fine to medium-grained; abundant clay laminae; well sorted, rounded sand; moist.	
			<u>20.0-22.0' SAMPLE.</u> Recovered 1.1/2.0' = 55%. SANDY CLAYSTONE: moderate brown (5 YR 3/4); friable; approximately 20% silt; unconsolidated; weathered; moist.	
			<u>22.0-25.0' SAMPLE.</u> Recovered 4.3/3.0' = 143%. CLAYSTONE: moderate brown (5 YR 4/4); abundant light brown (5 YR 5/6) stains; abundant patches of olive gray (5 Y 3/2) claystone; abundant grayish yellow green (5 GY 7/2) sandstone layers less than 1" thick; clay 3" to 1" thick; weathered; moist.	
			<u>25.0-27.0' SAMPLE.</u> Recovered 2.3/2.0' = 115%. 25.0-25.8': CLAYSTONE: same as above; moist. 25.8-27.0': CLAYSTONE: olive gray (5 Y 3/2); trace dark yellowish orange (10 YR 6/6) mottles; trace organic fragments; consolidated; slightly weathered; dry.	

LOG
OF
BOREHOLE

Location Rocky Flats Plant; 903 Pad Area
Coordinates N 35419.39 E 22989.24
Total Depth 30.00'

Borehole/Well No. 11-87BR
Ground Surface Elevation 5913.57'
Water Level Encountered 2.0'
Static 5896.76' (12/01/87)

Drilling Company Boyles Bros
Date Drilled July 29, 1987
Drilling Method Hollow Stem Auger
Logged By J.B. Bergman
Geologist

Driller T. Merritt
Helper T. High
Drilling Fluid None
Checked By J. Passik
Site Manager

CEARP Manager

Comments

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			<u>27.0-30.0' SAMPLE.</u> Recovered 3.4/3.0' = 113%. CLAYSTONE: same as above; dry. TOTAL DEPTH: 30.0'	

WELL COMPLETION INFORMATION

Location Rocky Flats Plant; 903 Pad Area

Coordinates N 35419.39 E 22989.24

Total Depth: Well 20.50'

Borehole 30.00'

Formation of Completion Arapahoe Formation

Casing Material Sch 5, type 316 TFJ stainless steel

Screen Material 0.010" wire wrap, type 316 TFJ stainless steel

Date Installed July 29, 1987

Installed By J.B. Bergman
Geologist

Well No. 11-87BR

Elevation: Ground Surface 5913.57'

Top of Casing 5915.36'

Casing Diameter 2" ID

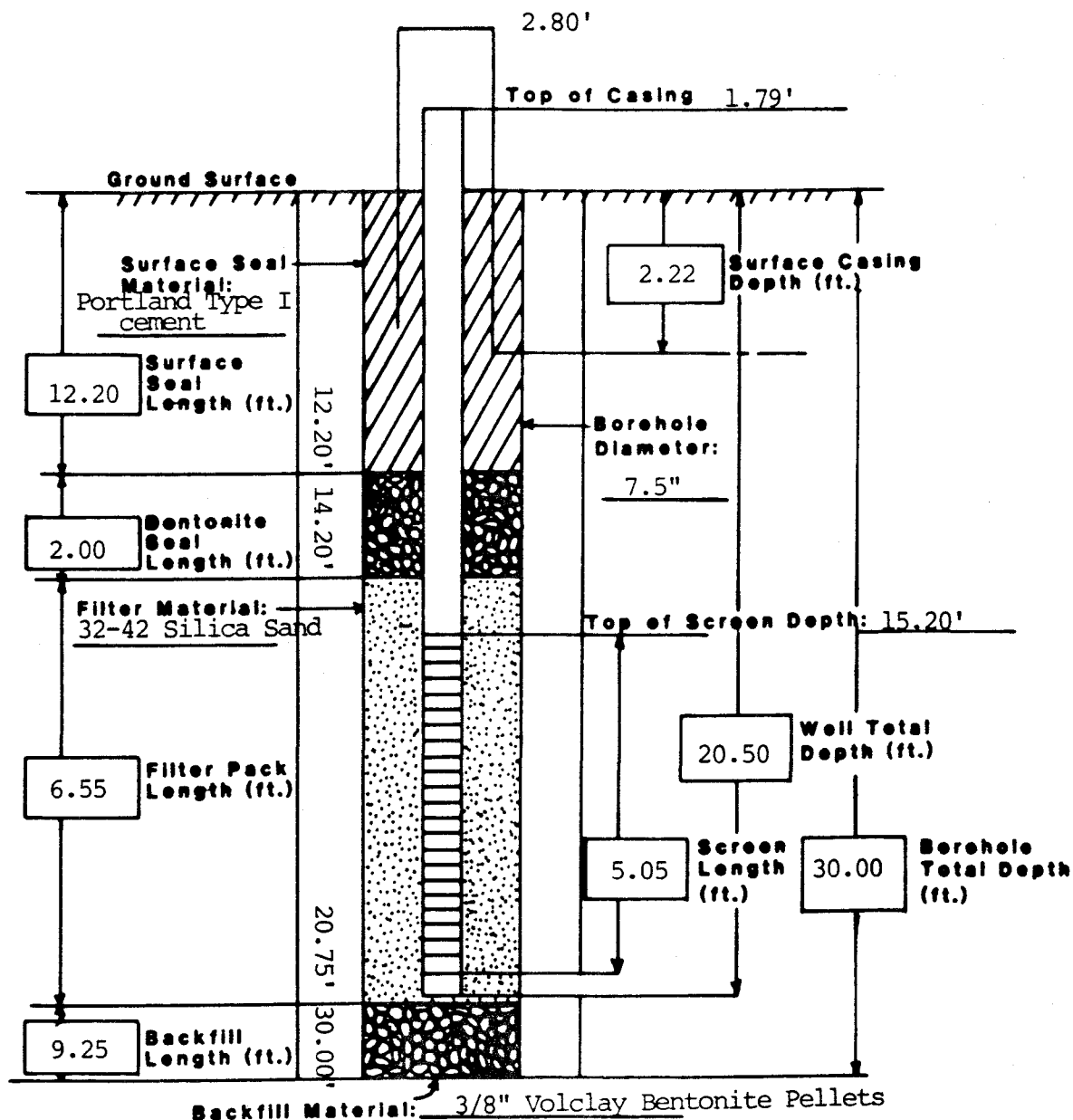
Surface Casing Diameter 5" ID

Approved By [Signature]

Site Manager

CEAMP Manager

Comments _____



12.11/87

Water Level Data
for
Rockwell (Rocky Flats)

Date
Measured

Depth to Water
from TOC

Elevation
TOC (ft)

Water Level
Elev. (ft)

** Well Number: 1187BR

12/01/87

18.60

5915.36

5896.76

INDEX OF DATA

Boring No.: 11-87A

Completed as well? No

Data in File

- ☒ Log of Borehole
- ☐ Well Construction Summaries
- ☐ Well Development Summaries
- ☐ Hydraulic Conductivity Test Data
and Results
- ☐ Packer Test Data and Results
- ☐ Water Level Data

LOG
OF
BOREHOLE

Location Rocky Flats Plant; 903 Pad Area
Coordinates N 35416.30 E 22899.30
Total Depth 7.70'

Borehole/Well No. 11-87A
Ground Surface Elevation 5922.67'
Water Level Encountered None
Static N/A

Drilling Company Boyles Bros
Date Drilled July 28, 1987
Drilling Method Hollow Stem Auger
Logged By J. B. Bergman
Geologist

Driller T. Merritt
Helper T. High
Drilling Fluid None
Checked By [Signature]
Site Manager
[Signature]
CEARP Manager

Comments Borehole backfilled with Portland Type I cement

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
0			<u>COLLUVIUM</u>	
			<u>0.0-3.0' SAMPLE.</u> Recovered 1.93/3.0' = 64%. 0.0-0.2': CLAY: medium dark gray (N 4/0); dense homogenous; dry. 0.2-1.3': SAND AND GRAVEL: moderate brown (5 YR 3/4); quartzite and granite gravels; unsorted; unconsolidated; angular; very fine-grained sand; cobbles; abundant roots and grasses; dry.	HNu Background=0.6 OVA Background=6.4 Ludlum Background=0.0. No readings over background.
5			<u>ARAPAHOE FORMATION</u>	
			1.3-1.93': CLAYSTONE: olive gray (5 Y 4/1); abundant caliche-reacts strongly with HCl; consolidated; abrupt contact; homogenous; dry.	
10			<u>3.0-5.0' SAMPLE.</u> Recovered 2.0/2.0' = 100%. CLAYSTONE: olive gray (5 Y 3/2); abundant caliche-reacts strongly with HCl; abundant dark yellowish orange (10 YR 6/6) limonite stains; homogenous; consolidated; dry.	
			<u>5.0-8.0' SAMPLE.</u> Recovered 2.7/3.0' = 90%. CLAYSTONE: same as above; dry.	
			TOTAL DEPTH: 7.70'	

INDEX OF DATA

Boring No.: 12-87BR

Completed as well? Yes

Data in File

- X Log of Borehole
- X Well Construction Summaries
- Well Development Summaries
- Hydraulic Conductivity Test Data
and Results
- Packer Test Data and Results
- X Water Level Data

LOG OF BOREHOLE

Location Rocky Flats Plant; 903 Pad Area
Coordinates N 35590.92 E 22956.17
Total Depth 16.00'

Borehole/Well No. 12-87BR
Ground Surface Elevation 5934.74'
Water Level Encountered 8.0'
Static 5927.54' (12/01/87)

Drilling Company Boyles Bros
Date Drilled July 14, 1987
Drilling Method Hollow Stem Auger
Logged By S. Rogal
Geologist

Driller D. Jarvie
Helper J. Duncan
Drilling Fluid None
Checked By [Signature]
Site Manager
[Signature]
CEARP Manager

Comments _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
0			<u>COLLUVIUM</u>	
			<u>0.0-2.0' SAMPLE.</u> Recovered 0.8/2.0' = 40%. SILTY CLAY: dusky brown (5 YR 2/2); trace sand; minor iron stains; grass; dry.	HNU Background=1.0 OVA Background=3.5 No Ludlum readings. No readings over background.
5			<u>2.0-4.0' SAMPLE.</u> Recovered 2.0/2.0' = 100%. 2.0-3.5': CLAY: dusky brown (5 YR 2/2); trace fine gravel; dry. 3.5-4.0': SANDY CLAY: pale olive (10 Y 6/2); minor iron stains; dry.	
10			<u>ARAPAHOE FORMATION</u>	
			<u>4.0-6.0' SAMPLE.</u> Recovered 1.85/2.0' = 93%. SANDSTONE: pale olive (10 Y 6/2); fine grained; well sorted; minor FeO stains; minor dark staining; dry.	
			<u>6.0-8.0' SAMPLE.</u> Recovered 1.9/2.0' = 95%. SANDSTONE: same as above; more iron staining.	
15			<u>8.0-10.0' SAMPLE.</u> Recovered 2.0/2.0' = 100%. SANDSTONE: same as above; wet.	
20				

LOG
OF
BOREHOLE

Location Rocky Flats Plant; 903 Pad Area
Coordinates N 35590.92 E 22956.17
Total Depth 16.00'

Drilling Company Boyles Bros
Date Drilled July 14, 1987
Drilling Method Hollow Stem Auger
Logged By S. Rogal
Geologist

Borehole/Well No. 12-87BR
Ground Surface Elevation 5934.74'
Water Level Encountered 8.0'
Static 5927.54' (12/01/87)
Driller D. Jarvie
Helper J. Duncan
Drilling Fluid None
Checked By J. Paschke
Site Manager

CEARP Manager

Comments _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			<u>10.0-12.0' SAMPLE.</u> Recovered 1.9/2.0' = 95%. SANDY SILTSTONE: light olive gray (5 Y 5/2); iron nodule at 11.5'; iron concretions; dry.	
			<u>12.0-14.0' SAMPLE.</u> Recovered 1.9/2.0' = 95%. SILTSTONE: light olive gray(5 Y 5/2); iron concretions; fractured; limonite stains; dry.	
			<u>14.0-16.0' SAMPLE.</u> Recovered 1.9/2.0' = 95%. CLAYSTONE: olive gray (5 Y 3/2); fine laminations; vertical fractures with iron stains; limonite stains; dry.	
			TOTAL DEPTH: 16.00'	

WELL COMPLETION INFORMATION

Location Rocky Flats Plant; 903 Pad Area

Well No. 12-87BR

Coordinates N 35590.92 E 22956.17

Elevation: Ground Surface 5934.74'

Total Depth: Well 10.25'

Top of Casing 5936.49'

Borehole 16.00'

Formation of Completion Arapahoe Formation

Casing Material Sch 5, type 316 TFJ stainless steel

Casing Diameter 2" ID

Screen Material 0.010" wire wrap, type 316 TFJ stainless steel

Surface Casing Diameter 5" ID

Date Installed July 15, 1987

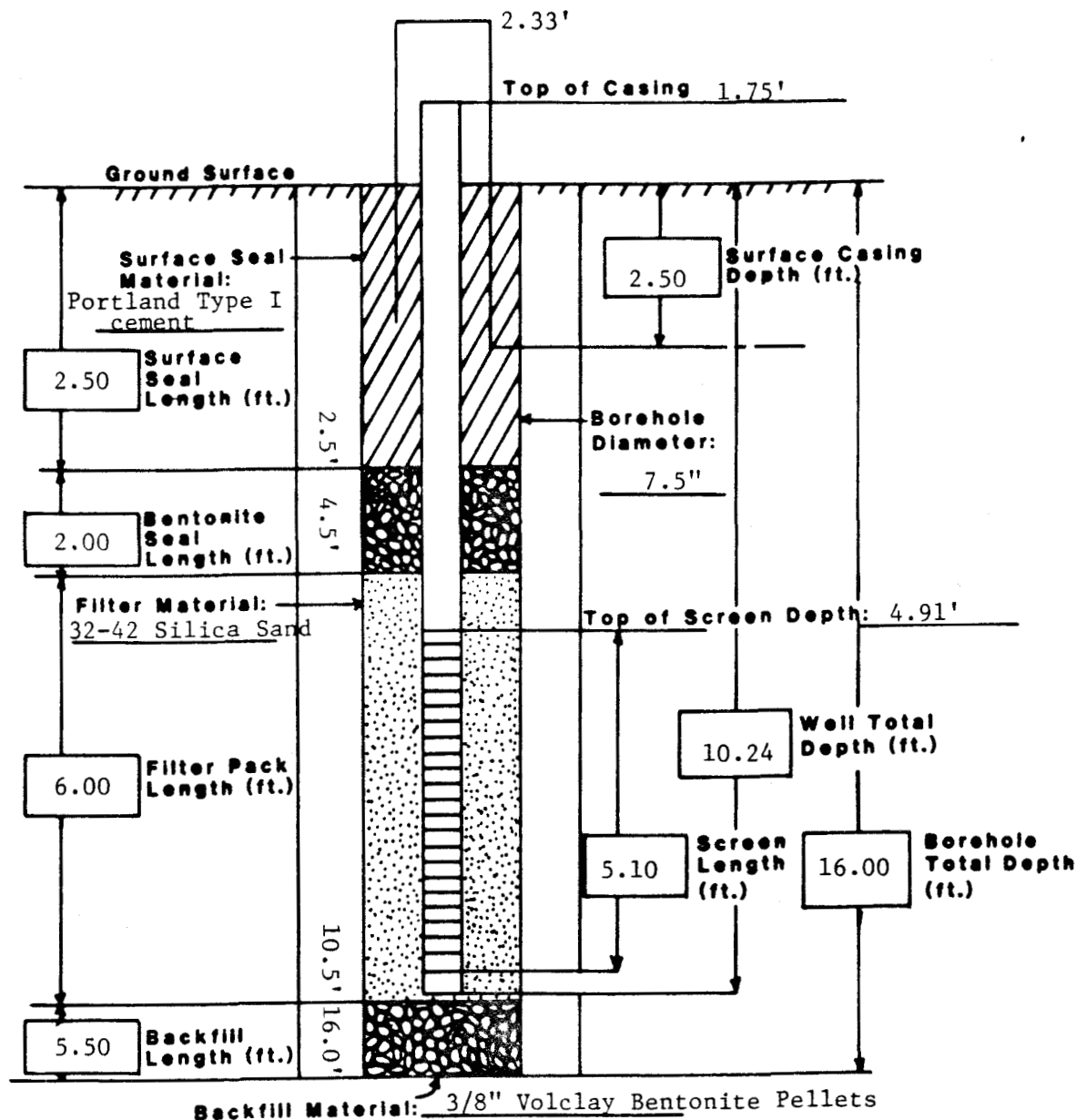
Approved By [Signature]

Installed By S. Rogal
Geologist

Site Manager

CEARP Manager

Comments Top of centralizer = 3.29'; bottom of centralizer = 2.10'



12/11/87

Water Level Data
for
Rockwell (Rocky Flats)

Date
Measured

Depth to Water
from TOC

Elevation
TOC (ft)

Water Level
Elev. (ft)

** Well Number: 1287BR

12/01/87

8.95

5936.49

5927.54

INDEX OF DATA

Boring No.: 12-87BRA

Completed as well? No

Data in File

- ☒ Log of Borehole
- ☐ Well Construction Summaries
- ☐ Well Development Summaries
- ☐ Hydraulic Conductivity Test Data
and Results
- ☐ Packer Test Data and Results
- ☐ Water Level Data

LOG OF BOREHOLE

Location Rocky Flats Plant; 903 Pad Area
Coordinates N 35564.56 E 22923.01
Total Depth 6.06'

Drilling Company Boyles Bros
Date Drilled August 8, 10, 1987
Drilling Method Hollow Stem Auger
Logged By B.Q. Hyde
Geologist

Borehole/Well No. 12-87BRA
Ground Surface Elevation 5933.85'
Water Level Encountered None
Static N/A
Driller N. Wheeler
Helper J. Duncan
Drilling Fluid None
Checked By J. Pasche
Site Manager
Brent Sem
GEARP Manager

Comments Borehole backfilled with Portland Type I cement due to poor recovery.

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
0			TOPSOIL	
			<u>0.0-2.0' SAMPLE.</u> Recovered 0.33/2.0' = 16%. TOPSOIL: moderate brown (5 YR 4/4); organic rich; pebble to silt size; sub- rounded clasts; poorly sorted; pebbles as- sociated with sedimentary rocks; quartz grains.	HNu Background=0.6. No HNu or Ludlum readings over background.
5			COLLUVIUM	
			<u>2.0-4.0' SAMPLE.</u> No recovery.	
			<u>4.0-6.0' SAMPLE.</u> Recovered 0.33/2.0' = 16%. SAND AND GRAVEL: pale olive (10 Y 6/2) to olive gray (5 Y 3/2); poorly sort- ed; matrix approximately 50% medium- grained sand and 50% clay; scattered pebble size clasts; unsupported in matrix; predominantly quartzite clasts; clasts and grains subangular; sand grains predom- inantly quartz with some micas; unconsolidated; dry.	
10			TOTAL DEPTH: 6.00'	

INDEX OF DATA

Boring No.: 13-87BRA

Completed as well? No

Data in File

- ☒ Log of Borehole
- ☐ Well Construction Summaries
- ☐ Well Development Summaries
- ☐ Hydraulic Conductivity Test Data
and Results
- ☐ Packer Test Data and Results
- ☐ Water Level Data

LOG
OF
BOREHOLE

Location Rocky Flats Plant; 903 Pad Area
Coordinates N 35429.20 E 23530.11
Total Depth 41.50'

Borehole/Well No. 13-87BRA
Ground Surface Elevation 5855.02'
Water Level Encountered None
Static N/A

Drilling Company Boyles Bros
Date Drilled July 27, 1987
Drilling Method Hollow Stem Auger
Logged By L.A. Gregory-Frost
Geologist

Driller T. Merritt
Helper T. High
Drilling Fluid None
Checked By J. Paschke
Site Manager
Brent Lewis
CEARP Manager

Comments _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
0			<u>TOPSOIL</u>	
			<u>0.0-2.0' SAMPLE.</u> Recovered 1.9/2.0' = 95%. 0.0-0.7': TOPSOIL: grayish red (5 R 4/2); sandy soil; abundant roots and grasses; abundant quartzite pebbles; base 0.1', 0.2' long flat quartzite pebbles/cobbles; sub-angular to angular; dry.	HNu Background=0.2 OVA Background=0.0 Ludlum Background = 0.0 No readings over background.
5			<u>COLLUVIUM</u>	
			0.7-1.9': CLAY: grayish red (5 R 4/2); trace very fine-grained sand; abundant quartzite pebbles; abundant caliche deposits; consolidated; dry.	
10			<u>2.0-4.0' SAMPLE.</u> Recovered 1.9/2.0' = 95%. CLAY: grayish red (5 R 4/2) to moderate yellowish brown (10 YR 5/4); abundant quartzite pebbles; subangular; abundant caliche deposits; occasional roots; consolidated; dry.	
15			<u>4.0-6.0' SAMPLE.</u> Recovered 2.0/2.0' = 100%. 4.0-4.3': Same as above (2.0-4.0').	
20				

LOG
OF
BOREHOLE

Location Rocky Flats Plant: 903 Pad Area
Coordinates N 35429.20 E 23530.11
Total Depth 41.50'

Borehole/Well No. 13-87BRA
Ground Surface Elevation 5855.02'
Water Level Encountered None
Static N/A

Drilling Company Boyles Bros
Date Drilled July 27, 1987
Drilling Method Hollow Stem Auger
Logged By L.A. Gregory-Frost
Geologist

Driller T. Merritt
Helper T. High
Drilling Fluid None
Checked By J. P. [Signature]
Site Manager

CEARP Manager

Comments _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
20			ARAPAHOE FORMATION	
			4.3-5.7': CLAYSTONE: grayish red (5 R 4/2) with abundant light brown (5 YR 5/6) and moderate yellowish brown (10 YR 5/4) layers and mottling; abundant caliche deposits and laminae; occasional iron oxide nodules; occasional roots; dry; weathered.	
25			5.7-6.0': SILTSTONE: light brown (5 YR 5/6); very fine-grained; sandy; clayey; weathered; dry.	
			<u>6.0-8.5' SAMPLE</u> Recovered 2.5/2.5' = 100%. CLAYSTONE: light brown (5 YR 5/6) and dark yellowish brown (10 YR 4/2); very fine-grained sandy, silty layers; abundant caliche deposits; weathered; consolidated; dry.	
30			<u>8.5-11.5' SAMPLE</u> Recovered 1.2/3.0' = 40%. 8.5-10.3': SANDSTONE: yellowish gray (5 Y 7/2); slightly silty; very fine-grained sandstone; well sorted; well rounded; dry. 10.3-10.5': CLAYSTONE: moderate yellowish brown (10 YR 5/4); occasional very fine grained sandstone layes; abundant caliche deposits; weathered; dry.	
35				
40				

LOG
OF
BOREHOLE

Location Rocky Flats Plant; 903 Pad Area
Coordinates N 35429.20 E 23530.11
Total Depth 41.50'

Borehole / Well No. 13-87BRA
Ground Surface Elevation 5855.02'
Water Level Encountered None
Static N/A

Drilling Company Boyles Bros
Date Drilled July 27, 1987
Drilling Method Hollow Stem Auger
Logged By L.A. Gregory-Frost
Geologist

Driller T. Merritt
Helper T. High
Drilling Fluid None
Checked By [Signature]

Site Manager

CEARP Manager

Comments

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
40				
			<p><u>11.5-13.5' SAMPLE.</u> Recovered 3.0/2.0' = 150%. 10.5-10.8': CLAYSTONE: Same as above (10.3-10.5'). 10.8-13.3': SANDSTONE: light olive gray (5 Y 6/1) and dark yellowish orange (10 YR 6/6); very fine-grained; well sorted; rounded; slightly silty and clayey; caliche along vertical fractures; damp to moist. 13.3-13.5': SANDSTONE: light olive gray (5 Y 6/1); very fine-grained; moderately cemented; calcareous; dry.</p> <p><u>13.5-16.5' SAMPLE.</u> Recovered 3.0/3.0' = 100%. 13.5-13.8': SANDSTONE: Same as above (13.3-13.5'). 13.8-16.3': CLAYSTONE: moderate yellowish brown (10 YR 5/4) with olive gray (5 Y 3/2) and dark yellowish orange (10 YR 6/6) mottling; very sandy; very fine-grained; well rounded; occasional caliche along vertical fractures; rare silty sand layers; weathered; dry to damp. 16.3-16.5': SANDSTONE: light olive gray (5 Y 6/1); very fine-grained; moderately cemented; calcareous; dry.</p> <p><u>16.5-18.5' SAMPLE.</u> Recovered 2.0/2.0' = 100%. SANDSTONE: light olive gray (5 Y 6/1); very fine to fine-grained; well rounded; moderately sorted; dry to damp.</p>	
45				

LOG
OF
BOREHOLE

Location Rocky Flats Plant: 903 Pad Area
Coordinates N 35429.20 E 23530.11
Total Depth 41.50'

Borehole/Well No. 13-87BRA
Ground Surface Elevation 5855.02'
Water Level Encountered None
Static N/A

Drilling Company Boyles Bros
Date Drilled July 27, 1987
Drilling Method Hollow Stem Auger
Logged By L.A. Gregory-Frost
Geologist

Driller T. Merritt
Helper T. High
Drilling Fluid None
Checked By [Signature]
Site Manager

CEARP Manager

Comments _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			<u>18.5-21.5' SAMPLE.</u> Recovered 3.0/3.0' = 100%. 18.5-19.55': SANDSTONE: moderate yellowish brown (10 YR 5/4); fine to medium-grained; well rounded; well sorted; friable; slightly calcareous; dry to moist. 19.55-20.5': SANDSTONE: moderate yellowish brown (10 YR 5/4) with light olive gray (5 Y 6/1) and brownish black (5 YR 2/1) layers and streaks; coarse-grained sand; several ironstone nodules; rounded oval shape; dry.	
			20.5-21.5': SANDSTONE: moderate yellowish brown (10 YR 5/4); fine to medium-grained; well rounded; well sorted; friable; slightly calcareous; dry to moist.	
			<u>21.5-23.5' SAMPLE.</u> Recovered 2.5/2.0' = 125%. 21.5-22.5': SANDSTONE: moderate yellowish brown (10 YR 5/4); fine to coarse-grained; moderately sorted; well rounded to rounded; clay laminae; abundant ironstone nodules and very coarse grained layers at base; fining upward; moist. 22.5-23.5': SANDSTONE: light olive gray (5 Y 6/1); very fine-grained; well sorted; well rounded; friable; moist.	

LOG
OF
BOREHOLE

Location Rocky Flats Plant; 903 Pad Area
Coordinates N 35429.20 E 23530.11
Total Depth 41.50'

Borehole/Well No. 13-87BRA
Ground Surface Elevation 5855.02'
Water Level Encountered None
Static N/A

Drilling Company Boyles Bros
Date Drilled July 27, 1987
Drilling Method Hollow Stem Auger
Logged By L.A. Gregory-Frost
Geologist

Driller T. Merritt
Helper T. High
Drilling Fluid None
Checked By [Signature]
Site Manager

CEARP Manager

Comments _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			<p><u>23.5-26.5' SAMPLE.</u> Recovered 3.4/3.0' = 113%.</p> <p>23.5-23.9': SANDSTONE: moderate yellowish brown (10 YR 5/4); clayey very fine to coarse-grained; poorly sorted; rounded to well rounded; moist.</p> <p>23.9-24.7': CLAYSTONE: moderate yellowish brown (10 YR 5/4); very fine-grained; sandy; silty; weathered; moist.</p> <p style="text-align: center;"><u>ARAPAHOE FORMATION</u></p> <p>24.7-26.5': CLAYSTONE: olive gray (5 Y 4/1) with occasional dark yellowish orange (10 YR 6/6) mottling; very fine-grained; sandy; slightly weathered; moist.</p> <p><u>26.5-28.5' SAMPLE.</u> Recovered 2.1/2.0' = 105%.</p> <p>26.5-28.5': CLAYSTONE: Same as above (24.7-26.5').</p> <p><u>28.5-31.5' SAMPLE.</u> Recovered 4.0/3.0' = 133%.</p> <p>CLAYSTONE: medium dark gray (N 4/0) and dark yellowish orange (10 YR 6/6); sandy; slightly weathered; moist.</p> <p><u>31.5-33.5' SAMPLE.</u> Recovered 1.9/2.0' = 95%.</p> <p>CLAYSTONE: medium dark gray (N 4/0) to dark greenish gray (5 GY 4/1) with dark yellowish orange (10 YR 6/6) mottling; silty; trace very fine-grained sand; slightly weathered; moist.</p>	

HNu Background = 0.4-0.6.

LOG
OF
BOREHOLE

Location Rocky Flats Plant: 903 Pad Area
Coordinates N 35429.20 E 23530.11
Total Depth 41.50'

Borehole/Well No. 13-87BRA
Ground Surface Elevation 5855.02'
Water Level Encountered None
Static N/A

Drilling Company Boyles Bros
Date Drilled July 27, 1987
Drilling Method Hollow Stem Auger
Logged By L.A. Gregory-Frost
Geologist

Driller T. Merritt
Helper T. High
Drilling Fluid None
Checked By J. Pascoe
Site Manager

CEARP Manager

Comments _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			<u>33.5-36.5' SAMPLE.</u> Recovered 3.0/3.0' = 100%. 33.5-35.3': CLAYSTONE: dark greenish gray (5 GY 4/1) with dark yellowish orange (10 YR 6/6) mottling and along fractures; silty; slightly weathered; moist. 35.3-36.5': SILTSTONE: light olive gray (5 Y 5/2); sandy; homogenous; moist.	
			<u>36.5-38.5' SAMPLE.</u> Recovered 2.0/2.0' = 100%. 36.5-37.75': SILTSTONE: Same as above (35.3-36.5'); becomes clayier toward base; gradational lower contact. 37.75-38.5': CLAYSTONE: light olive gray (5 Y 5/2); trace very fine-grained sand; silty; slightly weathered; moist.	
			<u>38.5-41.5' SAMPLE.</u> Recovered 1.5/3.0' = 50%. CLAYSTONE: light olive gray (5 Y 5/2) with dark yellowish orange (10 YR 5/6) iron staining along fractures; slightly silty; slightly weathered; moist.	
			TOTAL DEPTH: 41.50'	

INDEX OF DATA

Boring No.: 14-87BR

Completed as well? Yes

Data in File

- ☒ Log of Borehole
- ☒ Well Construction Summaries
- ☐ Well Development Summaries
- ☒ Hydraulic Conductivity Test Data
and Results
- ☐ Packer Test Data and Results
- ☒ Water Level Data

LOG
OF
BOREHOLE

Location Rocky Flats Plant; 903 Pad Area
Coordinates N 35236.67 E 23504.68
Total Depth 32.40'

Borehole/Well No. 14-87BR
Ground Surface Elevation 5855.0'
Water Level Encountered 12.5'; 19.0'; 22.5'
Static 5842.16' (12/01/87)

Drilling Company Boyles Bros
Date Drilled July 21, 1987
Drilling Method Hollow Stem Auger
Logged By J. B. Bergman
Geologist

Driller T. Merritt
Helper T. High
Drilling Fluid None
Checked By [Signature]
Site Manager

[Signature]
CEARP Manager

Comments _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
0			<u>TOPSOIL</u>	
			<u>0.0-2.0' SAMPLE.</u> Recovered 1.8/2.0' = 90%. 0.0-0.7': TOP SOIL: grayish red (5 R 4/2); sandy soil; abundant roots and grasses; abundant quartzite pebbles; unconsolidated; dry.	HNu Background=0.2 OVA Background=0.0 Ludlum Background = 0.0 No readings over background.
5			<u>COLLUVIUM</u>	
			0.7-1.8': CLAY: grayish red (5 R 4/2); trace very fine-grained sand; common caliche deposits; homogenous; consolidated; slightly damp.	
			<u>2.0-4.0' SAMPLE.</u> Recovered 2.0/2.0' = 100%. CLAY: grayish red (10 R 4/2); abundant quartzite pebbles and gravels; subangular; consolidated, abundant caliche deposits; dry.	
10			<u>4.0-7.0' SAMPLE.</u> Recovered 3.4/3.0' = 113%. 4.0-5.2': CLAY: same as above; dry.	
15			<u>ARAPAHOE FORMATION</u>	
			5.2-7.0': CLAYSTONE: grayish red (5 R 4/2); abundant caliche (laminae); strongly reacts with HCl; abundant light brown (5 YR 5/6); abundant FeO nodules at 6.0-6.2'; consolidated; dry to slightly moist.	
20				

LOG OF BOREHOLE

Location Rocky Flats Plant; 903 Pad Area

Coordinates N 35236.67 E 23504.68

Total Depth 32.40'

Borehole/Well No. 14-87BR

Ground Surface Elevation 5855.0'

Water Level Encountered 12.5'; 19.0'; 22.5'

Static 5842.16' (12/01/87)

Drilling Company Boyles Bros

Date Drilled July 21, 1987

Drilling Method Hollow Stem Auger

Logged By J. B. Bergman
Geologist

Driller T. Merritt

Helper T. High

Drilling Fluid None

Checked By _____
Site Manager

CEARP Manager

Comments _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
20			<p><u>7.0-9.0' SAMPLE.</u> Recovered 2.0/2.0' = 100%. CLAYSTONE: same as above; trace very fine-grained sand; dry.</p>	
25			<p><u>9.0-12.0' SAMPLE.</u> Recovered 3.0/3.0' = 100%. SANDSTONE: light brownish gray (5 YR 6/1); clay laminae; abundant moderate yellowish brown (10 YR 5/4) mottles; ranges from very fine-grained to medium-grained; rounded; well sorted; weathered; moderately consolidated; friable; slightly moist.</p>	
30			<p><u>12.2-12.5' SAMPLE.</u> No recovery.</p> <p><u>12.5-14.5' SAMPLE.</u> Recovered 2.3/2.0' = 115%. CLAYSTONE: moderate yellowish brown (10 YR 5/4); abundant, very fine-grained, silty sand; abundant FeO nodules, light brown (5 YR 5/6); wet at 12.5-12.7'; dry from 12.7-14.5'.</p>	
35			<p><u>14.5-17.5' SAMPLE.</u> Recovered 3.0/3.0' = 100%. CLAYSTONE: same as above; 40% clay, 30% very fine-grained sand; 30% silt; abundant light brown (5 YR 5/6) mottles; abundant light brown (5 YR 5/6) FeO nodules; dry.</p>	

LOG
OF
BOREHOLE

Location Rocky Flats Plant; 903 Pad Area
Coordinates N 35236.67 E 23504.68
Total Depth 32.40'

Borehole/Well No. 14-87BR
Ground Surface Elevation 5855.0'
Water Level Encountered 12.5'; 19.0'; 22.5'
Static 5842.16' (12/01/87)

Drilling Company Boyles Bros
Date Drilled July 21, 1987
Drilling Method Hollow Stem Auger
Logged By J. B. Bergman
Geologist

Driller T. Merritt
Helper T. High
Drilling Fluid None
Checked By J. P. Russell
Site Manager

CEARP Manager

Comments _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			<u>17.5-19.5' SAMPLE.</u> Recovered 2.0/2.0' = 100%. 17.5-19.0': CLAYSTONE: same as above; dry. 19.0-19.5': SANDSTONE: grayish orange pink (5 YR 7/2); abrupt contact; coarse grained; well sorted; rounded; homoge- nous; friable; wet.	
			<u>19.5-22.5' SAMPLE.</u> Recovered 3.0/3.0' = 100%. 19.5-21.5': SANDSTONE: same as above; grades down gradient to light brown (5 YR 5/6); abundant heavy minerals; wet. 21.5-22.5': CLAYSTONE: olive gray (5 Y 3/2); abundant light brown (5 YR 5/6) mottles; consolidated; dense; trace sand; homogenous; dry.	
			<u>22.5-25.5' SAMPLE.</u> Recovered 3.6/3.0' = 120%. 22.5-23.8: SANDSTONE: grayish orange pink (5 YR 7/2); coarse-grained; well sorted; rounded; common heavy minerals; wet. 23.8-25.5': CLAYSTONE: olive gray (5 Y 3/2); abundant light brown (5 YR 5/6) mottles; trace silty sand; dense; dry.	
			Hole total depth measured to 24.40'. Readjust depth.	

LOG
OF
BOREHOLE

Location Rocky Flats Plant; 903 Pad Area
Coordinates N 35236.67 E 23504.68
Total Depth 32.40'

Borehole/Well No. 14-87BR
Ground Surface Elevation 5855.0'
Water Level Encountered 12.5'; 19.0'; 22.5'
Static 5842.16' (12/01/87)

Drilling Company Boyles Bros
Date Drilled July 21, 1987
Drilling Method Hollow Stem Auger
Logged By J. B. Beroman
Geologist

Driller T. Merritt
Helper T. High
Drilling Fluid None
Checked By J. P. Parke
Site Manager

CEARP Manager

Comments

[illegible]

WELL COMPLETION INFORMATION

Location Rocky Flats Plant; 903 Pad Area
 Coordinates N 35236.67 E 23504.68
 Total Depth: Well 24.30'
 Borehole 32.40'

Well No. 14-87BR
 Elevation: Ground Surface 5855.00'
 Top of Casing 5856.73'

Formation of Completion Arapahoe Formation

Casing Material Sch 5, type 316 TFJ stainless steel
 Screen Material 0.010" wire wrap, type 316 TFJ stainless steel

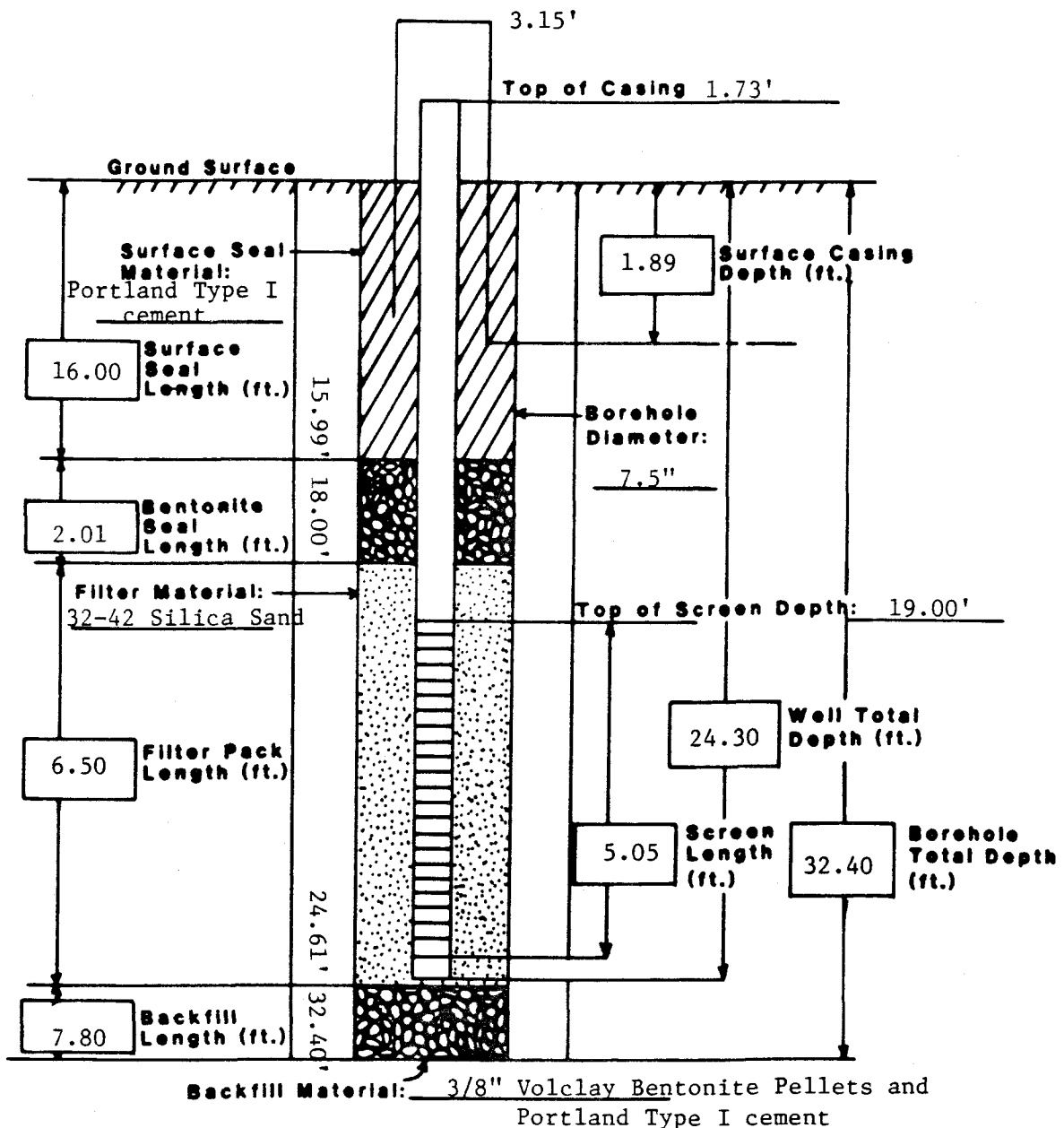
Date Installed July 22-23, 1987

Installed By J.B. Bergman
Geologist

Casing Diameter 2" ID
 Surface Casing Diameter 5" ID

Approved By [Signature]
Site Manager
[Signature]
CEARP Manager

Comments Used Portland Type I cement and 3/8" Volclay Bentonite Pellets as backfill due to problems encountered with slough during installation.



PROGRAM SLUGT, VERSION 4, OCT. 1985

THIS PROGRAM CALCULATES MEAN TRANSMISSIVITIES FROM SLUG-TEST DATA BASED ON TWO ANALYTICAL APPROACHES:

- (1) METHOD OF COOPER, BREDEHOEFT AND PAPADOPULOS, 1967 (ARTICLE IN VOL.3, NO.1 OF WRR ENTITLED "RESPONSE OF A FINITE DIAMETER WELL TO AN INSTANTANEOUS CHARGE OF WATER")
- (2) METHOD OF BOUWER AND RICE, 1976 (ARTICLE IN VOL. 12, NO.3 OF WRR ENTITLED "A SLUG TEST FOR DETERMINING HYDRAULIC CONDUCTIVITY OF UNCONFINED AQUIFERS WITH COMPLETELY OR PARTIALLY PENETRATING WELLS")

PROJECT NO.: 6-0118-87

CLIENT: Rockwell International

ITE LOCATION: Rocky Flats Plant

DATE OF SLUG TEST: 10-15-87

FIELD INVESTIGATOR: Kevin McNeill

WELL NO.: 14-87 BR

INPUT DATA ARE:

INNER CASING DIAMETER = 2.00 INCHES

LENGTH OF SCREEN OR INTAKE PORTION = 6.50 FEET

INNER SCREEN OR OPEN-HOLE DIAMETER = 2.00 INCHES

DEPTH FROM STATIC LEVEL TO BOTTOM OF SCREEN = 11.55 FEET

DIAMETER OF DRILLED HOLE = 7.50 INCHES

THICKNESS OF SATURATED AQUIFER ZONE = 11.30 FEET

ESTIMATED POROSITY OF GRAVEL PACK = .25

FALLING-HEAD INDEX = 0 ("1" IF FALLING, "0" IF RISING)

NUMBER OF HEAD-TIME DATA POINTS = 42

TIME (sec)	HEAD (FEET)
1.00	1.260
2.00	1.260
3.00	1.260
4.00	1.260
5.00	1.250
6.00	1.250
16.00	1.230
36.00	1.210
66.00	1.180
96.00	1.150
126.00	1.130
156.00	1.110
186.00	1.080
216.00	1.060
246.00	1.040
276.00	1.020
306.00	.990
336.00	.970
366.00	.950
396.00	.940
426.00	.910
456.00	.900
501.00	.870
551.00	.840
621.00	.810
681.00	.770
741.00	.740
801.00	.720
861.00	.700
921.00	.670
981.00	.640
1101.00	.600
1221.00	.560
1341.00	.530
1611.00	.460
1851.00	.410
2091.00	.370
2331.00	.330
2631.00	.300
2931.00	.270
3231.00	.260
3531.00	.240

HO WAS COMPUTED FROM INTERCEPT OF PLOT OF LOG(H) VS. TIME

SUCCESSIVE COMPUTED
VALUES FOR HO
(FEET)

1.1615
1.1739

METHOD OF BOUWER AND RICE

COMPUTED RESULTS USING DIAMETER OF DRILLED HOLE:

PERMEABILITY = $7.41\text{E-}07$ FT/sec = $2.26\text{E-}05$ CM/sec

TRANSMISSIVITY = $8.38\text{E-}06$ FT**2/sec

COMPUTED RESULTS USING DIAMETER OF CASING AND SCREEN:

PERMEABILITY = $1.06\text{E-}06$ FT/sec = $3.23\text{E-}05$ CM/sec

TRANSMISSIVITY = $1.20\text{E-}05$ FT**2/sec

12/11/87

Water Level Data
for
Rockwell (Rocky Flats)

<u>Date Measured</u>	<u>Depth to Water from TOC</u>	<u>Elevation TOC (ft)</u>	<u>Water Level Elev. (ft)</u>
--------------------------	------------------------------------	-------------------------------	-----------------------------------

** Well Number: 1487BR

12/01/87	14.57	5856.73	5842.16
----------	-------	---------	---------

INDEX OF DATA

Boring No.: 15-87/BH30-87

Completed as well? Yes

Data in File

- ☒ Log of Borehole
- ☒ Well Construction Summaries
- ☐ Well Development Summaries
- ☐ Hydraulic Conductivity Test Data
and Results
- ☐ Packer Test Data and Results
- ☒ Water Level Data

LOG
OF
BOREHOLE

Location Rocky Flats Plant; 903 Pad Area
Coordinates N 36020.14 E 23139.88
Total Depth 27.00'

Borehole/Well No. 15-87/BH30-87
Ground Surface Elevation 5970.89'
Water Level Encountered 20.00'
Static 5952.44' (12/01/87)

Drilling Company Boyles Bros
Date Drilled June 16, 1987
Drilling Method Hollow Stem Auger
Logged By K.D. Holliway
Geologist

Driller R. Sharp
Helper T. Merritt
Drilling Fluid None
Checked By J. Pasche
Site Manager
D. Lewis
CEARP Manager

Comments Sample BH308720WT doubles as sample BH308722CT due to insufficient recovery for two samples.

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
0			ROCKY FLATS ALLUVIUM	
			<u>0.0-2.0' SAMPLE.</u> Recovered 1.1/2.0' = 55%. SANDY GRAVEL: dark yellowish brown (10 YR 4/2); quartzite pebbles and cobbles; trace clay; fine-grained sand (2.0-3.5 phi); poorly sorted; roots and grasses; dry.	HNu Background=0.2 OVA Background=0.0 No Ludlum readings.
5			<u>2.0-3.4' SAMPLE.</u> Recovered 1.4/1.4' = 100%. SANDY GRAVEL: moderate orange pink (5 YR 8/4); quartzite cobbles and pebbles; trace clay; fine-grained sand (2.0-1.0 phi); dry.	<u>0.0-9.0'</u> : Composite sample: BH30870010. <u>5.0'</u> : Field screen readings: HNu = 5.0-15.0; OVA = 0.1.
10			<u>3.4-4.0'</u> : No recovery. Drilled with center bit.	<u>9.0-10.35'</u> : Waste sample: BH308710WS.
			<u>4.0-7.0' SAMPLE.</u> Recovered 1.2/3.0' = 40%. SANDY GRAVEL: light brown (5 YR 5/6); quartzite cobbles and pebbles; trace clay; fine-grained sand (2.5-1.5 phi); some caliche; very pale orange (10 YR 8/2); damp to dry.	<u>10.0'</u> : Field screen readings: HNu = 5.0-15.0; OVA = 0.1.
15			<u>7.0-8.5' SAMPLE.</u> Recovered 1.15/1.5' = 77%. SANDY GRAVEL: light brown (5 YR 5/6); quartzite cobbles and pebbles; trace clay; fine-grained sand (2.5-1.5 phi); dry.	<u>11.5-17.15'</u> : Composite sample: BH30871020.
			<u>8.5-9.0'</u> : No recovery. Drilled with center bit.	<u>15.0'</u> : Field screen readings: HNu = 10.0; OVA = 0.1. <u>20.0'</u> : Field screen readings: HNu = 2.0; OVA = 0.2.
20				

LOG OF BOREHOLE

Location Rocky Flats Plant: 903 Pad Area
 Coordinates N 36020.14 E 23139.88
 Total Depth 27.00'

Borehole/Well No. 15-87/BH30-87
 Ground Surface Elevation 5970.89'
 Water Level Encountered 20.00'
 Static 5952.44' (12/01/87)

Drilling Company Boyles Bros
 Date Drilled June 16, 1987
 Drilling Method Hollow Stem Auger
 Logged By K.D. Holliway
 Geologist

Driller R. Sharp
 Helper T. Merritt
 Drilling Fluid None
 Checked By [Signature]
 Site Manager

CEARP Manager

Comments Sample BH308720WT doubles as sample BH308722CT due to insufficient recovery for two samples.

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
20			<u>9.0-11.5' SAMPLE.</u> Recovered 1.35/2.5' = 54%. SANDY GRAVEL: same as above; dry.	<u>20.0-20.8':</u> Water table sample: BH308720WT.
			<u>11.5-14.0' SAMPLE.</u> Recovered 1.2/2.5' = 48%. SANDY GRAVEL: same as above; damp.	
25			<u>14.0-16.0' SAMPLE.</u> Recovered 0.7/2.0' = 35%. SANDY GRAVEL: same as above; damp.	<u>24.5-25.2':</u> Bedrock sample: BH308725BR.
			<u>16.0-20.0' SAMPLE.</u> Recovered 1.15/4.0' = 29%. SANDY GRAVEL: light brown (5 YR 5/6) to grayish orange (10 YR 7/4) in sand zone 16.80-17.10'; coarse to fine-grained sand (0.5-3.0 phi); well sorted; damp to moist.	
30			<u>20.0-22.0' SAMPLE.</u> Recovered 2.5/2.0' = 125%. GRAVEL: light brown (5 YR 5/6); some sand; quartzite cobbles and pebbles; wet.	
			<u>ARAPAHOE FORMATION</u>	
			<u>22.0-24.5' SAMPLE.</u> Recovered 2.2/2.5' = 88%. CLAYSTONE: light olive gray (5 Y 5/2); moderate reddish orange (10 R 6/6); iron stained patches; damp to moist.	
			<u>24.5-27.0' SAMPLE.</u> Recovered 2.65/2.5' = 106%. CLAYSTONE: same as above; damp to moist.	
			TOTAL DEPTH: 27.00'	

WELL COMPLETION INFORMATION

Location Rocky Flats Plant; 903 Pad Area

Well No. 15-87/BH30-87

Coordinates N 36020.14 E 23139.88

Elevation: Ground Surface 5970.89'

Total Depth: Well 22.53'

Top of Casing 5972.99'

Borehole 27.05'

Formation of Completion Rocky Flats Alluvium

Casing Material Sch 5, type 316 TFJ stainless steel

Casing Diameter 2" ID

Screen Material 0.010" wire wrap, type 316 TFJ stainless steel

Surface Casing Diameter 5" ID

Date Installed June 17, 1987

Approved By [Signature]

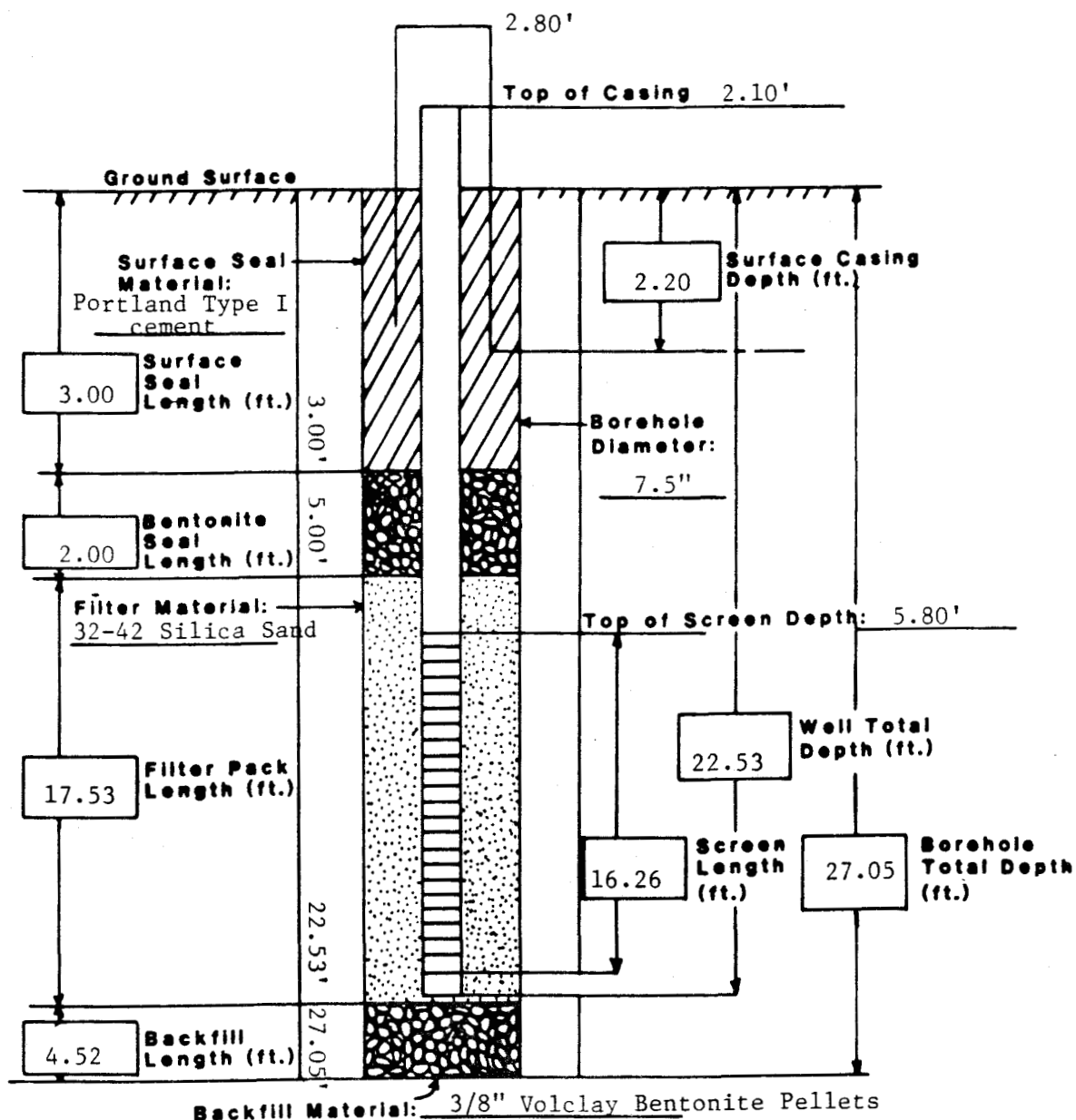
Installed By K.D. Holliday

Geologist

Site Manager

CEARP Manager

Comments Water encountered in a sandy gravel at 20.0'. Water level in well 6/17/87 = 22.9'.



12/11/87

Water Level Data
for
Rockwell (Rocky Flats)

<u>Date Measured</u>	<u>Depth to Water from TOC</u>	<u>Elevation TOC (ft)</u>	<u>Water Level Elev. (ft)</u>
** Well Number: 1587			
09/29/87	20.80	5972.99	5952.19
12/01/87	20.55	5972.99	5952.44

INDEX OF DATA

Boring No.: 16-87BR

Completed as well? Yes

Data in File

- X Log of Borehole
- X Well Construction Summaries
- Well Development Summaries
- X Hydraulic Conductivity Test Data
and Results
- X Packer Test Data and Results
- X Water Level Data

LOG OF BOREHOLE

Location Rocky Flats Plant; 903 Pad Area
Coordinates N 36139.59 E 23140.49
Total Depth 174.00'

Borehole/Well No. 16-87BR
Ground Surface Elevation 5969.06'
Water Level Encountered 20.0'
Static 5885.51' (12/01/87)

Drilling Company Boyles Bros
Date Drilled June 17-18, 1987; July 6-8, 1987
Drilling Method Hollow Stem Auger; Rotary Core
Logged By C.J. Wood; J.B. Bergman
Geologist

Driller N. Wheeler; P. Bushkovski
Helper D. Jarvie; K. Parker
Drilling Fluid None
Checked By J.J. Pasake
Site Manager
Brent Lewis
GEARP Manager

Comments Surface casing set to 49.17' by Craig Wood on June 18, 1987.

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
0			ROCKY FLATS ALLUVIUM	
			<u>0.0-2.0' SAMPLE.</u> Recovered 2.0/2.0' = 100%. SANDY GRAVELS: pale yellowish brown (10 YR 6/2); quartzite pebbles and cobbles; subrounded to subangular; some rock in upper 0.5'; dry.	HNu Background=0.0 OVA Background=0.0 No readings over background.
5			<u>2.0-4.0' SAMPLE.</u> Recovered 1.64/2.0' = 82%. SAND AND GRAVEL: moderate brown (5 YR 4/4); some sandy clay; quartzite pebbles and cobbles; subrounded to subangular; dry.	HNu Background=0.2-0.8. No OVA readings. No readings over background.
10			<u>4.0-6.0' SAMPLE.</u> Recovered 0.95/2.0' = 47%. SANDY GRAVEL: moderate brown (5 YR 4/4); grades into caliche; dry.	
15			<u>6.0-7.0' SAMPLE.</u> Recovered 1.45/1.0' = 145%. SAND AND CLAY: yellowish gray (5 Y 7/2) to moderate brown (5 Y 4/4); some quartzite cobbles; coarse sand; some caliche; damp.	
20			<u>7.0-9.0' SAMPLE.</u> Recovered 0.9/2.0' = 45%. SANDY GRAVEL: light brown (5 YR 6/4); quartzite pebbles and cobbles; subrounded to subangular; dry.	

LOG
OF
BOREHOLE

Location Rocky Flats Plant; 903 Pad Area
Coordinates N 36139.59 E 23140.49
Total Depth 174.00'

Borehole/Well No. 16-87BR
Ground Surface Elevation 5969.06'
Water Level Encountered 20.0'
Static 5885.51' (12/01/87)

Drilling Company Boyles Bros
Date Drilled June 17-18, 1987; July 6-8, 1987
Drilling Method Hollow Stem Auger; Rotary Core
Logged By C.J. Wood; J.B. Bergman
Geologist

Driller N. Wheeler; P. Bushkovski
Helper D. Jarvie; K. Parker
Drilling Fluid None
Checked By J. Pasche
Site Manager

CEARP Manager

Comments Surface casing set to 49.17' by Craig Wood on June 18, 1987.

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
20			<u>9.0-11.0' SAMPLE.</u> Recovered 1.75/2.0' = 87%. SANDY GRAVEL TO SANDY CLAY: gravels moderate brown (5 YR 4/4); sand light brown (5 YR 5/6) to dark greenish gray (5 GY 4/1); iron staining streaks moderate reddish orange (10 R 6/6); trace of caliche; weathered; dry.	
25			<u>11.0-13.0' SAMPLE.</u> Recovered 2.0/2.0' = 100%. SAND: moderate reddish orange (10 R 6/6); some quartzite pebbles; trace caliche; coarse sand; weathered; damp.	
30			<u>13.0-15.0' SAMPLE.</u> Recovered 2.0/2.0' = 100%. SANDY GRAVELS: dark yellowish orange (10 YR 6/6) to grayish green (10 GY 5/2); quartzite pebbles and cobbles; damp to dry.	
35			<u>15.0-17.0' SAMPLE.</u> Recovered 2.0/2.0' = 100%. SANDY GRAVELS: moderate reddish orange (10 R 6/6); highly weathered; nu- merous quartzite pebbles; trace caliche; damp.	
40			<u>17.0-19.0' SAMPLE.</u> Recovered 1.7/2.0' = 85%. SAND: moderate reddish orange (10 R 6/6); weathered; numerous quartzite peb- bles; damp.	

LOG
OF
BOREHOLE

Location Rocky Flats Plant; 903 Pad Area

Coordinates N 36139.59 E 23140.49

Total Depth 174.00'

Borehole/Well No. 16-87BR

Ground Surface Elevation 5969.06'

Water Level Encountered 20.0'

Static 5885.51' (12/01/87)

Drilling Company Boyles Bros

Driller N. Wheeler ; P. Bushkovski

Date Drilled June 17-18, 1987; July 6-8, 1987

Helper D. Jarvie ; K. Parker

Drilling Method Hollow Stem Auger ; Rotary Core

Drilling Fluid None

Logged By C.J. Wood ; J.B. Bergman

Checked By J. Pasolke
Site Manager

Geologist

CEARP Manager

Comments Surface casing set to 49.17' by Craig Wood on June 18, 1987.

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
40			<u>19.0-21.0' SAMPLE.</u> Recovered 1.7/2.0' = 85%. SANDY GRAVEL: moderate brown (5 YR 4/4); quartzite pebbles and cobbles; wet.	
			<u>21.0-23.0' SAMPLE.</u> Recovered 1.6/2.0' = 80%. 21.0-21.9': SANDY GRAVEL: same as above; wet.	
45			<u>ARAPAHOE FORMATION</u>	
			21.9-22.6': CLAY: olive gray (5 Y 3/2); dry.	
			<u>23.0-24.0' SAMPLE.</u> Recovered 0.9/1.0' = 90%. CLAY: medium light gray (N 6/0); iron staining moderate reddish orange (10 R 6/6); wet.	48.41-58.06': Packer Test Interval #23, aborted test.
50			<u>24.0-26.0' SAMPLE.</u> Recovered 2.0/2.0' = 100%. CLAY: medium light gray (N 6/0) to olive gray (5 Y 3/2); moderate reddish orange (10 R 6/6); iron staining to dark reddish brown (10 R 4/6); highly weathered; damp to wet.	
55			<u>26.0-28.0' SAMPLE.</u> Recovered 2.0/2.0' = 100%. CLAY: olive gray (5 Y 3/2); iron staining moderate reddish orange (10 R 6/6); slightly weathered; damp.	55.90-65.55': Packer Test Interval #22. 57.90-67.55': Packer Test Interval #21, failed on 2/3 pressure test.
60				

LOG
OF
BOREHOLE

Location Rocky Flats Plant; 903 Pad Area
Coordinates N 36139.59 E 23140.49
Total Depth 174.00'

Borehole/Well No. 16-87BR
Ground Surface Elevation 5969.06'
Water Level Encountered 20.0'
Static 5885.51' (12/01/87)

Drilling Company Boyles Bros
Date Drilled June 17-18, 1987; July 6-8, 1987
Drilling Method Hollow Stem Auger; Rotary Core
Logged By C.J. Wood; J.B. Bergman
Geologist

Driller N. Wheeler; P. Bushkovski
Helper D. Jarvie; K. Parker
Drilling Fluid None
Checked By J. Paschke
Site Manager

CEARP Manager

Comments Surface casing set to 49.17' by Craig Wood on June 18, 1987.

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
60			<p><u>28.0-29.0' SAMPLE.</u> Recovered 1.4/1.0' = 140%. CLAY: olive gray (5 Y 3/2); iron staining moderate reddish orange (10 R 6/6); weathered; damp.</p>	
65			<p><u>29.0-30.0' SAMPLE.</u> Recovered 1.35/1.0' = 135%. CLAY: moderate olive brown (5 Y 4/4) to olive gray (5 Y 3/2); some iron staining moderate reddish orange (10 R 6/6); damp.</p>	
70			<p><u>30.0-32.0' SAMPLE.</u> Recovered 2.0/2.0' = 100%. CLAY: moderate reddish orange (10 R 6/6) to dark reddish brown (10 R 3/4); upper foot olive gray (5 Y 3/2), moderate reddish orange (10 R 6/6) with iron staining throughout; some dusky yellow areas (5 Y 6/4); highly weathered; wet.</p>	<p><u>67.55-77.20':</u> Packer Test Interval #20.</p> <p><u>69.55-79.20':</u> Packer Test Interval #19, aborted test.</p>
75			<p><u>32.0-34.0' SAMPLE.</u> Recovered 2.0/2.0' = 100%. CLAY: olive gray (5 Y 3/2); iron staining moderate reddish orange (10 R 6/6); weathered; wet.</p>	
			<p><u>34.0-36.0' SAMPLE.</u> Recovered 2.0/2.0' = 100%. CLAY: same as above; wet.</p>	
			<p><u>36.0-38.0' SAMPLE.</u> Recovered 2.0/2.0' = 100%. CLAY: same as above; wet.</p>	
80				<p><u>79.05-88.70':</u> Packer Test Interval #18.</p>

LOG OF BOREHOLE

Location Rocky Flats Plant; 903 Pad Area
Coordinates N 36139.59 E 23140.49
Total Depth 174.00'

Borehole/Well No. 16-87BR
Ground Surface Elevation 5969.06'
Water Level Encountered 20.0'
Static 5885.51' (12/01/87)

Drilling Company Boyles Bros
Date Drilled June 17-18, 1987; July 6-8, 1987
Drilling Method Hollow Stem Auger; Rotary Core
Logged By C.J. Wood; J.B. Bergman
Geologist

Driller N. Wheeler; P. Bushkovski
Helper D. Jarvie; K. Parker
Drilling Fluid None
Checked By J. Pasolka
Site Manager

CEARP Manager

Comments Surface casing set to 49.17' by Craig Wood on June 18, 1987.

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
80			<u>38.0-40.0' SAMPLE.</u> Recovered 2.0/2.0' = 100%. CLAY: light olive gray (5 Y 5/2); moderate reddish orange (10 R 6/6) iron staining; weathered; wet.	
85			<u>40.0-42.0' SAMPLE.</u> Recovered 2.0/2.0' = 100%. CLAY: light olive gray (5 Y 5/2) with some olive gray (5 Y 3/2) streaks; some moderate reddish orange (10 R 6/6) iron staining; weathered; wet.	
			<u>42.0-44.0' SAMPLE.</u> Recovered 2.1/2.0' = 105%. CLAY: same as above; wet.	<u>88.70-98.35':</u> Packer Test Interval #17.
90			<u>44.0':</u> Unweathered/weathered bedrock contact.	<u>90.70-100.35':</u> Packer Test Interval #16, aborted test.
			<u>44.0-46.0' SAMPLE.</u> Recovered 2.0/2.0' = 100%. CLAYSTONE: brownish black (5 YR 2/1); unweathered.	
95			<u>46.0-48.0' SAMPLE.</u> Recovered 2.0/2.0' = 100%. CLAYSTONE: same as above.	
			<u>48.0-50.0' SAMPLE.</u> Recovered 2.0/2.0' = 100%. CLAYSTONE: same as above.	
100				

LOG
OF
BOREHOLE

Location Rocky Flats Plant; 903 Pad Area
Coordinates N 36139.59 E 23140.49
Total Depth 174.00'

Borehole/Well No. 16-87BR
Ground Surface Elevation 5969.06'
Water Level Encountered 20.0'
Static 5885.51' (12/01/87)

Drilling Company Boyles Bros
Date Drilled June 17-18, 1987; July 6-8, 1987
Drilling Method Hollow Stem Auger; Rotary Core
Logged By C.J. Wood; J.B. Bergman
Geologist

Driller N. Wheeler; P. Bushkovski
Helper D. Jarvie; K. Parker
Drilling Fluid None
Checked By J. Pasche
Site Manager

CEARP Manager

Comments Surface casing set to 49.17' by Craig Wood on June 18, 1987.

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
100			<u>48.0-51.5' SAMPLE.</u> Recovered 2.2/3.5' = 63%. RQD = 1.4/2.2' = 64%. 48.0-49.4': CEMENT. 49.4-50.2': CLAYSTONE: olive gray (5 Y 3/2); trace moderate yellowish brown (10 YR 5/4) mottles; homogenous; consolidated; no sand; wet.	<u>100.50-110.15': Packer Test Interval #15.</u>
105			<u>51.5-55.5' SAMPLE.</u> Recovered 4.0/4.0' = 100%. RQD = 3.25/4.0' = 81%. CLAYSTONE: grayish black (N 2/0); abundant lignite stringers from 50.5-51.5'; organic rich; some sand; very fine-grained sand; dense; consolidated; dry.	<u>109.72-119.37': Packer Test Interval #14.</u>
110			<u>55.5-60.0' SAMPLE.</u> Recovered 4.5/4.5' = 100%. RQD = 3.2/4.5' = 71%. CLAYSTONE: olive gray (5 Y 3/2); trace sand bottom 0.5'; dense; homogenous; moist.	
115			<u>60.0-65.0' SAMPLE.</u> Recovered 1.6/5.0' = 32%. RQD = 0.5/1.6' = 31%. CLAYSTONE: olive gray (5 Y 3/2); some very fine-grained silty sand; trace organics; dense; homogenous; moist.	
120			<u>65.0-68.0' SAMPLE.</u> Recovered 2.95/3.0' = 98%. RQD = 2.0/2.95' = 68%. SANDY CLAYSTONE: olive gray (5 Y 3/2); trace organic fragments; sandstone at 66.1-67.1'; very fine-grained; silty; moist to dry.	<u>119.37-129.02': Packer Test Interval #13.</u>

LOG
OF
BOREHOLE

Location Rocky Flats Plant; 903 Pad Area
Coordinates N 36139.59 E 23140.49
Total Depth 174.00'

Borehole/Well No. 16-87BR
Ground Surface Elevation 5969.06'
Water Level Encountered 20.0'
Static 5885.51' (12/01/87)

Drilling Company Boyles Bros
Date Drilled June 17-18, 1987; July 6-8, 1987
Drilling Method Hollow Stem Auger; Rotary Core
Logged By C.J. Wood; J.B. Bergman
Geologist

Driller N. Wheeler; P. Bushkovski
Helper D. Jarvie; K. Parker
Drilling Fluid None
Checked By A. Pasche
Site Manager

CEARP Manager

Comments Surface casing set to 49.17' by Craig Wood on June 18, 1987.

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
120			<u>68.0-72.0' SAMPLE.</u> Recovered 3.0/4.0' = 75%. RQD = 3.0/3.0' = 100%. CLAYSTONE: olive gray (5 Y 3/2); abundant organics; consolidated; moist.	
125			<u>72.0-76.0' SAMPLE.</u> Recovered 4.5/4.0' = 113%. RQD = 3.5/4.0' = 88%. CLAYSTONE: olive gray (5 Y 3/2); abundant organics; dense; moist. Last 1.0' grade to dusky green (5 G 3/2) claystone with no organics; silty; moist to dry.	
130			<u>76.0-80.0' SAMPLE.</u> Recovered 3.2/4.0' = 80%. RQD = 1.85/3.2' = 58%. 76.0-76.4: CLAYSTONE; olive gray (5 Y 3/2); silty; organic rich; dense; moist. 76.4-77.2: SANDSTONE/CLAYSTONE: olive gray (5 Y 3/2) and light olive gray (5 Y 5/2); interbedded medium-grained sandstone; rounded; sorted; moist. 77.2-78.6': SANDSTONE olive gray (5 Y 3/2); well sorted; rounded; medium to fine-grained; salt & pepper texture; abun- dant organics; moist. 78.6-79.2': SANDSTONE same as above but more clay; damp to dry.	<u>129.02-138.67':</u> Packer Test Interval #12. <u>131.02-140.67':</u> Packer Test Interval #11; packers not sealing; aborted. <u>132.94-142.59':</u> Packer Test Interval #10; failed test. <u>134.94-144.59':</u> Packer Test Interval #9; failed test. <u>136.94-146.59':</u> Packer Test Interval #8, aborted test.
135			<u>80.0-84.0' SAMPLE.</u> Recovered 4.0/4.0' = 100%. RQD = 3.5/4.0' = 88%. CLAYSTONE: olive gray (5 Y 3/2); con- solidated; organic rich; homogenous; damp.	
140				

LOG
OF
BOREHOLE

Location Rocky Flats Plant; 903 Pad Area
Coordinates N 36139.59 E 23140.49
Total Depth 174.00'

Borehole/Well No. 16-87BR
Ground Surface Elevation 5969.06'
Water Level Encountered 20.0'
Static 5885.51' (12/01/87)

Drilling Company Boyles Bros
Date Drilled June 17-18, 1987; July 6-8, 1987
Drilling Method Hollow Stem Auger; Rotary Core
Logged By C.J. Wood; J.B. Bergman
Geologist

Driller N. Wheeler; P. Bushkovski
Helper D. Jarvie; K. Parker
Drilling Fluid None
Checked By J. Pasella
Site Manager

CEARP Manager

Comments Surface casing set to 49.17' by Craig Wood on June 18, 1987.

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
140			<u>84.0-88.0' SAMPLE.</u> Recovered 4.0/4.0' = 100%. RQD = 4.0/4.0' = 100%. 84.0-87.7': CLAYSTONE: same as above with some lignite stringers and trace sand; moist. 87.7-88.0': SANDSTONE: olive gray (5 Y 3/2); very fine-grained; silty; common organic fragments; moist.	<u>140.21-149.86':</u> Packer Test Interval #7; aborted test. <u>142.21-151.86':</u> Packer Test Interval #6; aborted test. <u>144.71-154.36':</u> Packer Test Interval #5; aborted test. <u>146.71-156.36':</u> Packer Test Interval #4; aborted test. <u>149.35-159.0':</u> Packer Test Interval #3; aborted test. <u>151.35-161.0':</u> Packer Test Interval #2; aborted test.
145			<u>88.0-92.0' SAMPLE.</u> Recovered 4.0/4.0' = 100%. RQD = 3.2/4.0' = 80%. CLAYSTONE: olive gray (5 Y 3/2); con- solidated; homogenous; trace organics; sandy top 3"; moist.	
150			<u>92.0-96.5' SAMPLE.</u> Recovered 4.5/4.5' = 100%. RQD = 4.0/4.5' = 89%. CLAYSTONE: same as above; moist to wet; with moderate yellowish brown (10 YR 5/4) siltstone nodule at 94.0-94.5'; <1" wide; dry.	
155			<u>96.5-100.5' SAMPLE.</u> Recovered 3.3/4.0' = 83%. RQD = 0/4.0' = 0%. 96.5-98.0': CLAYSTONE: olive gray (5 Y 3/2); two siltstone nodules, moderate yel- lowish brown (10 YR 5/4), approximate 1/4" diameter; elliptical; dry to moist. 98.0-99.8': SANDY CLAYSTONE: olive gray (5 Y 3/2); very fine-grained sand; well sorted; silty; moist.	<u>155.0-163.30':</u> Packer Test Interval #1; failed test.
160				

LOG
OF
BOREHOLE

Location Rocky Flats Plant; 903 Pad Area
Coordinates N 36139.59 E 23140.49
Total Depth 174.00'

Borehole/Well No. 16-87BR
Ground Surface Elevation 5969.06'
Water Level Encountered 20.0'
Static 5885.51' (12/01/87)

Drilling Company Boyles Bros
Date Drilled June 17-18, 1987 ; July 6-8, 1987
Drilling Method Hollow Stem Auger ; Rotary Core
Logged By C.J. Wood ; J.B. Bergman
Geologist

Driller N. Wheeler ; P. Bushkovski
Helper D. Jarvie ; K. Parker
Drilling Fluid None
Checked By J. Pasche
Site Manager

CEARP Manager

Comments Surface casing set to 49.17' by Craig Wood on June 18, 1987.

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
160			<p><u>100.5-105.0' SAMPLE.</u> Recovered 4.0/4.5' = 89%. RQD = 4.0/4.0' = 100%. SANDSTONE: medium gray (N 5/0); silica cement; fine to medium-grained; sorted; rounded; two light brownish gray (5 YR 6/1) siltstone nodules at 102.9' and 104.2'; clayey in top 6"; salt & pepper look; moist.</p>	
165			<p><u>105.0-109.0' SAMPLE.</u> Recovered 4.3/4.0' = 108%. RQD = 3.8/4.3' = 88%. SANDSTONE: same as above with several clay stringers; very dense; rock hard sandstone at 108.1 to 109'; very fine-grained; calcareous cement; reacts strongly with HCl; moist to dry.</p>	
170			<p><u>109.0-113.0' SAMPLE.</u> Recovered 3.3/4.0' = 83%. RQD = 1.2/3.3' = 36%. 109.0-109.5': SANDSTONE: medium gray (N 5/0); rock hard; very dense; very fine-grained; calcareous cement; damp. 109.5-112.3': CLAYEY SANDSTONE: medium gray (N 5/0); very fine-grained; rounded; well sorted; increased clay with depth; moist to damp.</p>	
175				

LOG OF BOREHOLE

Location Rocky Flats Plant; 903 Pad Area
Coordinates N 36139.59 E 23140.49
Total Depth 174.00'

Borehole/Well No. 16-87BR
Ground Surface Elevation 5969.06'
Water Level Encountered 20.0'
Static 5885.51' (12/01/87)

Drilling Company Boyles Bros
Date Drilled June 17-18, 1987; July 6-8, 1987
Drilling Method Hollow Stem Auger; Rotary Core
Logged By C.J. Wood; J.B. Bergman
Geologist

Driller N. Wheeler; P. Bushkovski
Helper D. Jarvie; K. Parker
Drilling Fluid None
Checked By A. Pasche
Site Manager

CEARP Manager

Comments Surface casing set to 49.17' by Craig Wood on June 18, 1987.

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			<u>117.0-121.0' SAMPLE.</u> Recovered 5.0/4.0' = 125%. RQD = 5.0/5.0' = 100%. 117.0-118.0': CLAYEY SANDSTONE AND SANDY CLAYSTONE: same as above with more clay; dense; moist. 118.0-121.0': SANDY CLAYSTONE: medi- um gray (N 5/0); fine-grained sand; rounded; well sorted; light brownish gray (5 YR 6/1) siltstone nodule at 120.7'; moist.	
			<u>121.0-125.0' SAMPLE.</u> Recovered 3.7/4.0' = 93%. RQD = 3.7/3.7' = 100%. INTERBEDDED SANDSTONE/ CLAY- STONE: medium gray (N 5/0); very fine- grained; silty, clayey sandstone; interbed- ded clay laminations; sandstone is rounded; dense; sorted; 10° dip on frac- ture; cross-bedded; moist.	
			<u>125.0-129.0' SAMPLE.</u> Recovered 3.8/4.0' = 95%. RQD = 3.8/3.8' = 100%. INTERBEDDED SANDSTONE/ CLAY- STONE: same as above; sandstone beds 1- 2" thick; clay beds 1-2" thick; some light brownish gray (5 YR 6/1) siltstone nod- ules 1" diameter; damp.	
			<u>129.0-133.0' SAMPLE.</u> Recovered 3.0/4.0' = 75%. RQD = 3.0/3.0' = 100%. INTERBEDDED SANDSTONE/ CLAY- STONE: same as above with clay layers 0.8 to 1.0' thick.	

LOG
OF
BOREHOLE

Location Rocky Flats Plant; 903 Pad Area
Coordinates N 36139.59 E 23140.49
Total Depth 174.00'

Borehole/Well No. 16-87BR
Ground Surface Elevation 5969.06'
Water Level Encountered 20.0'
Static 5885.51' (12/01/87)

Drilling Company Boyles Bros
Date Drilled June 17-18, 1987; July 6-8, 1987
Drilling Method Hollow Stem Auger; Rotary Core
Logged By C.J. Wood; J.B. Bergman
Geologist

Driller N. Wheeler; P. Bushkovski
Helper D. Jarvie; K. Parker
Drilling Fluid None
Checked By J. Passella
Site Manager

CEARP Manager

Comments Surface casing set to 49.17' by Craig Wood on June 18, 1987.

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			<u>133.0-137.0' SAMPLE.</u> Recovered 5.0/4.0' = 125%. RQD = 5.0/5.0' = 100%. SANDSTONE/SANDY CLAYSTONE: medium gray (N 5/0); very fine-grained; well sorted; rounded; dense; horizontal fractures; moist to wet.	
			<u>137.0-141.0' SAMPLE.</u> Recovered 4.0/4.0' = 100%. RQD = 4.0/4.0' = 100%. SANDSTONE/SANDY CLAYSTONE: same as above with medium to fine-grained sand; damp.	
			<u>141.0-145.0' SAMPLE.</u> Recovered 3.9/4.0' = 98%. RQD = 3.7/3.9' = 95%. SANDSTONE: medium gray (N 5/0); fine to medium-grained sand; well sorted; rounded; silica cement; organic fragment in shoe; damp.	
			<u>145.0-149.0' SAMPLE.</u> Recovered 3.2/4.0' = 80%. RQD = 2.8/3.2' = 88%. SANDSTONE/CLAYSTONE INTERBEDDED: medium gray (N 5/0); clay layers 1"; sand layers 3-6"; silty, clayey sandstone; dense; consolidated; moist to wet.	

LOG
OF
BOREHOLE

Location Rocky Flats Plant; 903 Pad Area
Coordinates N 36139.59 E 23140.49
Total Depth 174.00'

Borehole/Well No. 16-87BR
Ground Surface Elevation 5969.06'
Water Level Encountered 20.0'
Static 5885.51' (12/01/87)

Drilling Company Boyles Bros
Date Drilled June 17-18, 1987; July 6-8, 1987
Drilling Method Hollow Stem Auger; Rotary Core
Logged By C.J. Wood ; J.B. Bergman
Geologist

Driller N. Wheeler ; P. Bushkovski
Helper D. Jarvie ; K. Parker
Drilling Fluid None
Checked By J. Pascello
Site Manager

CEARP Manager

Comments Surface casing set to 49.17' by Craig Wood on June 18, 1987.

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			<u>149.0-153.0' SAMPLE.</u> Recovered 4.9/4.0' = 123%. RQD = 4.9/4.9' = 100%. 149.0-149.6': CLAYEY SANDSTONE: medium gray (N 5/0); very fine-grained; silty; rounded; damp. 149.6-153.0': CLAYSTONE: olive gray (5 Y 3/2); no sand; some organic fragments; consolidated; moist.	
			<u>153.0-157.0' SAMPLE.</u> Recovered 4.0/4.0' = 100%. RQD = 4.0/4.0' = 100%. SANDSTONE/CLAYSTONE INTERBEDDED: medium gray (N 5/0); very fine-grained sand; rounded; cross-bedded; wet; claystone layers 1"; sandstone layers 1"; dense; homogenous; few organics; moist.	
			<u>157.0-161.0' SAMPLE.</u> Recovered 3.7/4.0' = 93%. RQD = 3.2/3.7' = 86%. SANDSTONE: medium gray (N 5/0); some clay lenses 1/4" to 4" wide; cross-bedded; fine to very fine-grained; well sorted; rounded; salt & pepper; very dense calcareous cemented sandstone at 157.3-157.6'; moist to wet.	

LOG
OF
BOREHOLE

Location Rocky Flats Plant; 903 Pad Area
Coordinates N 36139.59 E 23140.49
Total Depth 174.00'

Borehole/Well No. 16-87BR
Ground Surface Elevation 5969.06'
Water Level Encountered 20.0'
Static 5885.51' (12/01/87)

Drilling Company Boyles Bros
Date Drilled June 17-18, 1987 ; July 6-8, 1987
Drilling Method Hollow Stem Auger; Rotary Core
Logged By C.J. Wood ; J.B. Bergman
Geologist

Driller N. Wheeler; P. Bushkovski
Helper D. Jarvie ; K. Parker
Drilling Fluid None
Checked By J. Pasella
Site Manager

CEARP Manager

Comments Surface casing set to 49.17' by Craig Wood on June 18, 1987.

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			<u>161.0-165.0' SAMPLE.</u> Recovered 2.9/4.0' = 73%. RQD = 2.3/2.9' = 79%. 161.0-161.9': SANDSTONE: medium light gray (N 6/0); very fine-grained; calcareous cement; very dense; strongly reacts with HCl; damp to dry. 161.9-163.0': SANDSTONE: medium gray (N 5/0); very fine-grained; few clay laminae; silty; rounded; cross-bedded; well sorted; moist to wet. 163.0-163.3': CLAYSTONE: olive gray (5 Y 3/2); trace sand; dense; homogenous; trace organics; moist to wet.	
			<u>165.0-169.5' SAMPLE.</u> Recovered 5.0/4.5' = 111%. RQD = 5.0/5.0' = 100%. CLAYSTONE: olive gray (5 Y 3/2); consolidated; homogenous; no sand; trace organics; wet.	
			<u>169.5-174.0' SAMPLE.</u> Recovered 5.1/5.0' = 102%. RQD = 5.1/5.1' = 100%. CLAYSTONE: same as above; wet.	
			TOTAL DEPTH: 174.0'	

WELL COMPLETION INFORMATION

Location Rocky Flats Plant; 903 Pad Area

Well No. 16-87BR

Coordinates N 36139.59 E 23140.49

Elevation: Ground Surface 5969.06'

Total Depth: Well 125.24'

Top of Casing 5970.98'

Borehole 174.00'

Formation of Completion Arapahoe Formation

Casing Material Sch 5, type 316 TFJ stainless steel

Casing Diameter 2" ID

Screen Material 0.010" wire wrap, type 316 TFJ stainless steel

Surface Casing Diameter 5" ID

Date Installed July 14-16, 1987

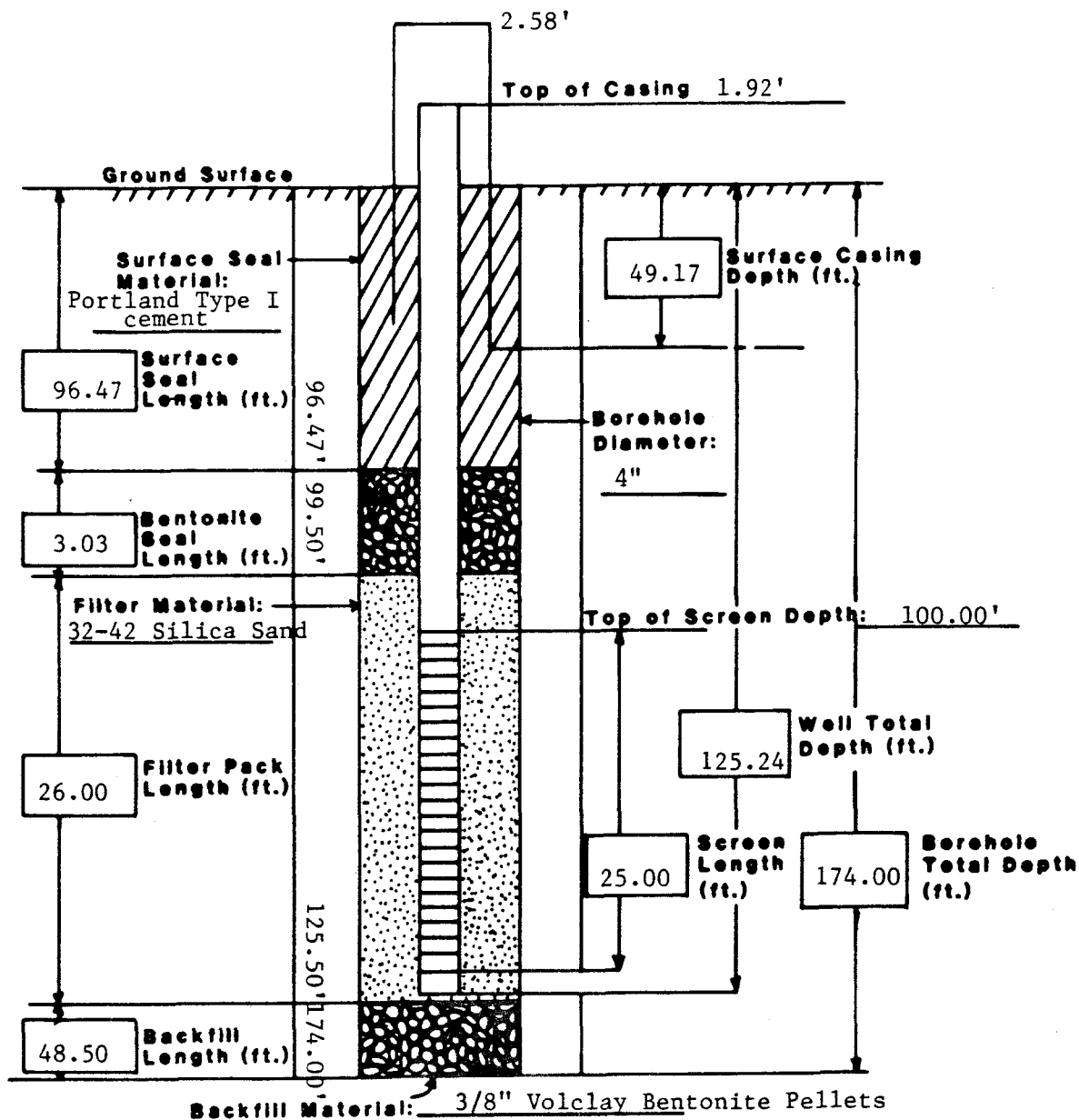
Approved By J. B. Bergman

Installed By J.B. Bergman
Geologist

Site Manager

CEARP Manager

Comments Surface casing set to 49.17' by C.J. Wood on June 18, 1987.



PROGRAM SLUGT, VERSION 4.OCT. 1985

THIS PROGRAM CALCULATES MEAN TRANSMISSIVITIES FROM SLUG-TEST DATA BASED ON TWO ANALYTICAL APPROACHES:

- (1) METHOD OF COOPER, BREDEHOEFT AND PAPADOPULOS, 1967 (ARTICLE IN VOL.3, NO.1 OF WRR ENTITLED "RESPONSE OF A FINITE DIAMETER WELL TO AN INSTANTANEOUS CHARGE OF WATER")
- (2) METHOD OF BOUWER AND RICE, 1976 (ARTICLE IN VOL. 12, NO.3 OF WRR ENTITLED "A SLUG TEST FOR DETERMINING HYDRAULIC CONDUCTIVITY OF UNCONFINED AQUIFERS WITH COMPLETELY OR PARTIALLY PENETRATING WELLS")

PROJECT NO.: 6-0118-87

CLIENT: Rockwell International

SITE LOCATION: Rocky Flats Plant

DATE OF SLUG TEST: 10-14-87

FIELD INVESTIGATOR: Kevin McNeill

WELL NO.: 16-87 BR

INPUT DATA ARE:

INNER CASING DIAMETER = 2.00 INCHES

LENGTH OF SCREEN OR INTAKE PORTION = 16.00 FEET

INNER SCREEN OR OPEN-HOLE DIAMETER = 2.00 INCHES

DEPTH FROM STATIC LEVEL TO BOTTOM OF SCREEN = 34.44 FEET

DIAMETER OF DRILLED HOLE = 4.00 INCHES

THICKNESS OF SATURATED AQUIFER ZONE = 34.44 FEET

ESTIMATED POROSITY OF GRAVEL PACK = .25

FALLING-HEAD INDEX = 0 ("1" IF FALLING, "0" IF RISING)

NUMBER OF HEAD-TIME DATA POINTS = 22

TIME (sec)	HEAD (FEET)
1.00	1.260
2.00	1.260
3.00	1.260
4.00	1.260
5.00	1.260
6.00	1.250
7.00	1.250
8.00	1.250
9.00	1.250
10.00	1.250

11.00	1.250
41.00	1.250
71.00	1.250
101.00	1.250
161.00	1.250
221.00	1.240
281.00	1.240
341.00	1.240
521.00	1.240
701.00	1.240
881.00	1.240
1091.00	1.240

HO WAS COMPUTED FROM INTERCEPT OF PLOT OF LOG(H) VS. TIME

SUCCESSIVE COMPUTED
VALUES FOR HO
(FEET)

1.2526
1.2530

1

METHOD OF COOPER, BREDEHOEFT AND PAPADOPULOS

COMPUTED RESULTS:

COMPUTED VALUE OF HO = 1.27 FEET

NOTE: TRANSMISSIVITY UNITS ARE IN FT**2/SEC

AND PERMEABILITY UNITS ARE IN FT/SEC

ALPHA	STORATIVITY	MEAN TRANSMIS- SIVITY	MEAN PERMEA- BILITY	MINIMUM TRANS.	MAXIMUM TRANS.	RATIO OF "T" RANGE TO "SAR	ROOT MEAN SQUARE OF TIME DEVIATIONS	DIFFERENCE IN RMS
1.000E-11	1.000E-01	5.066E-07	1.471E-08	7.778E-09	2.973E-06	5.352555	361.54	.00
1.000E-12	1.000E-02	2.095E-06	6.084E-08	4.738E-08	1.013E-05	4.911057	357.53	4.01
1.000E-03	1.000E-03	7.502E-06	2.178E-07	1.371E-07	3.981E-05	5.238136	359.91	-2.38
1.000E-04	1.000E-04	1.499E-05	4.352E-07	2.447E-07	8.326E-05	5.539035	360.98	-1.07
1.000E-05	1.000E-05	2.268E-05	6.586E-07	3.521E-07	1.284E-04	5.645257	361.42	-.44
1.000E-06	1.000E-06	3.022E-05	8.776E-07	4.576E-07	1.728E-04	5.702072	361.63	-.21
1.000E-07	1.000E-07	3.762E-05	1.092E-06	5.599E-07	2.162E-04	5.733021	361.77	-.14
1.000E-08	1.000E-08	4.488E-05	1.303E-06	6.615E-07	2.589E-04	5.753181	361.86	-.08
1.000E-09	1.000E-09	5.213E-05	1.514E-06	7.621E-07	3.016E-04	5.771000	361.92	-.07
1.000E-10	1.000E-10	5.921E-05	1.719E-06	8.620E-07	3.427E-04	5.774183	361.95	-.03

METHOD OF BOWLER AND RICE

COMPUTED RESULTS USING DIAMETER OF DRILLED HOLE:

PERMEABILITY = $9.52\text{E-}09$ FT/sec = $2.90\text{E-}07$ CM/sec

TRANSMISSIVITY = $3.28\text{E-}07$ FT**2/sec

COMPUTED RESULTS USING DIAMETER OF CASING AND SCREEN:

PERMEABILITY = $1.10\text{E-}08$ FT/sec = $3.34\text{E-}07$ CM/sec

TRANSMISSIVITY = $3.78\text{E-}07$ FT**2/sec

WELL NO.: 16-B7 BR

INPUT DATA ARE:

INNER CASING DIAMETER = 2.00 INCHES

INNER SCREEN OR OPEN-HOLE DIAMETER = 2.00 INCHES

DIAMETER OF DRILLED HOLE = 4.00 INCHES

ESTIMATED POROSITY OF GRAVEL PACK = .25

LENGTH OF SCREEN OR INTAKE PORTION = 26.00 FEET

DEPTH FROM STATIC LEVEL TO BOTTOM OF SCREEN = 34.44 FEET

THICKNESS OF SATURATED AQUIFER ZONE = 34.44 FEET

FALLING-HEAD INDEX = 0 ("1" IF FALLING, "0" IF RISING)

NUMBER OF HEAD-TIME DATA POINTS = 22

TIME (sec)	HEAD (FEET)
1.00	1.260
2.00	1.260
3.00	1.260
4.00	1.260
5.00	1.260
6.00	1.250
7.00	1.250
8.00	1.250
9.00	1.250
10.00	1.250
11.00	1.250
41.00	1.250
71.00	1.250
101.00	1.250
161.00	1.250
221.00	1.240
281.00	1.240
341.00	1.240
521.00	1.240
701.00	1.240

881.00 1.240
1091.00 1.240

HO WAS COMPUTED FROM KNOWN VOLUME OF SLUG

VOLUME OF SLUG ENTERED = .03270 CUBIC FEET

METHOD OF COOPER, BREDEHOEFT AND PAPADOPULOS

COMPUTED RESULTS:

COMPUTED VALUE OF HO = 1.50 FEET

NOTE: TRANSMISSIVITY UNITS ARE IN FT²/sec AND PERMEABILITY UNITS ARE IN FT/sec

ALPHA	STORATIVITY	MEAN TRANSMIS- SIVITY	MEAN PERMEA- BILITY	MINIMUM TRANS.	MAXIMUM TRANS.	RATIO OF "T" RANGE TO T _{BAR}	ROOT MEAN SQUARE OF TIME DEVIATIONS	DIFFERENCE IN RMS
1.000E-01	1.000E-01	4.057E-05	1.178E-06	3.020E-07	2.826E-04	6.959200	365.92	.00
1.000E-02	1.000E-02	1.285E-04	3.730E-06	9.317E-07	8.989E-04	6.989861	366.03	-.11
1.000E-03	1.000E-03	2.392E-04	6.946E-06	1.713E-06	1.677E-03	7.004902	366.08	-.05
1.000E-04	1.000E-04	3.509E-04	1.019E-05	2.499E-06	2.463E-03	7.011212	366.10	-.02
1.000E-05	1.000E-05	4.600E-04	1.336E-05	3.266E-06	3.230E-03	7.014784	366.12	-.01
1.000E-06	1.000E-06	5.671E-04	1.647E-05	4.019E-06	3.983E-03	7.016734	366.12	-.01
1.000E-07	1.000E-07	6.727E-04	1.953E-05	4.762E-06	4.725E-03	7.018092	366.13	.00
1.000E-08	1.000E-08	7.772E-04	2.257E-05	5.498E-06	5.461E-03	7.019024	366.13	.00
1.000E-09	1.000E-09	8.811E-04	2.558E-05	6.229E-06	6.191E-03	7.019701	366.13	.00
1.000E-10	1.000E-10	9.844E-04	2.858E-05	6.955E-06	6.917E-03	7.020319	366.14	.00

PACKER TEST ANALYSIS

WELL NO. 16-87BR

ROCKY FLATS PLANT; 903 PAD AREA

JOB NO. 2029-17-02

DATE TESTED: 7/14/87

BY: J.B. BERGMAN

TEST INTERVAL (FEET BELOW G.S.): 48.41 - 58.06

MATERIAL TESTED: ARAPAHOE CLAYSTONE

DEPTH TO WATER (FEET BELOW G.S.): 103.08

$$K = \frac{Q}{2(\pi)(L)(H)} \ln\left(\frac{L}{R}\right)$$

1ST P1/3 TEST

Q = INJECTION RATE = .00005792 (FEET³/MIN)

L = LENGTH OF TEST INTERVAL = 9.65 FEET

TEST INTERVAL IS ABOVE WATER TABLE

HEAD = DEPTH OF CENTER OF INTERVAL + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)

= 53.24 + 8.30 + .00 * 2.31 = 61.53

R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .0000000630 FT/MIN

K = .00000003 CM/SEC

P2/3 TEST

PACKER TEST ANALYSIS

WELL NO. 16-87BR

ROCKY FLATS PLANT; 903 PAD AREA

JOB NO. 2029-17-02

DATE TESTED: 7/14/87

BY: J.B. BERGMAN

TEST INTERVAL (FEET BELOW G.S.): 55.90 - 65.55

MATERIAL TESTED: ARAPAHOE CLAYSTONE

DEPTH TO WATER (FEET BELOW G.S.): 103.08

$$K = \frac{Q}{2(\pi)(L)(H)} \ln\left(\frac{L}{R}\right)$$

1ST P1/3 TEST

Q = INJECTION RATE = .00007240 (FEET³/MIN)

L = LENGTH OF TEST INTERVAL = 9.65 FEET

TEST INTERVAL IS ABOVE WATER TABLE

HEAD = DEPTH OF CENTER OF INTERVAL + GAGE HEIGHT

+ GAGE PRESSURE (IN FEET)

= 60.73 + 8.37 + .00 * 2.31 = 69.10

R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .0000000702 FT/MIN

K = .00000004 CM/SEC

P2/3 TEST

Q = INJECTION RATE = .00076023 (FEET³/MIN)

L = LENGTH OF TEST INTERVAL = 9.65 FEET

TEST INTERVAL IS ABOVE WATER TABLE

HEAD = DEPTH OF CENTER OF INTERVAL + GAGE HEIGHT

+ GAGE PRESSURE (IN FEET)

= 60.73 + 5.72 + 11.00 * 2.31 = 91.86

R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .0000005542 FT/MIN

K = .00000028 CM/SEC

2ND P1/3 TEST

PACKER TEST ANALYSIS

WELL NO. 16-87BR

ROCKY FLATS PLANT; 903 PAD AREA

JOB NO. 2029-17-02

DATE TESTED: 7/14/87

BY: J.B. BERGMAN

TEST INTERVAL (FEET BELOW G.S.): 57.90 - 67.55

MATERIAL TESTED: ARAPAHOE CLAYSTONE

DEPTH TO WATER (FEET BELOW G.S.): 103.08

$$K = \frac{Q}{2(\pi)(L)(H)} \ln\left(\frac{L}{R}\right)$$

1ST P1/3 TEST

Q = INJECTION RATE = .00001448 (FEET³/MIN)

L = LENGTH OF TEST INTERVAL = 9.65 FEET

TEST INTERVAL IS ABOVE WATER TABLE

HEAD = DEPTH OF CENTER OF INTERVAL + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)

= 62.73 + 8.31 + .00 * 2.31 = 71.04

R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .0000000136 FT/MIN

K = .00000001 CM/SEC

P2/3 TEST

PACKER TEST ANALYSIS

WELL NO. 16-87BR

ROCKY FLATS PLANT; 903 PAD AREA

JOB NO. 2029-17-02

DATE TESTED: 7/14/87

BY: J.B. BERGMAN

TEST INTERVAL (FEET BELOW G.S.): 67.55 - 77.20

MATERIAL TESTED: ARAPAHOE CLAYSTONE

DEPTH TO WATER (FEET BELOW G.S.): 103.08

$$K = \frac{Q}{2(\pi)(L)(H)} \ln\left(\frac{L}{R}\right)$$

1ST P1/3 TEST

Q = INJECTION RATE = .00014480 (FEET³/MIN)

L = LENGTH OF TEST INTERVAL = 9.65 FEET

TEST INTERVAL IS ABOVE WATER TABLE

HEAD = DEPTH OF CENTER OF INTERVAL + GAGE HEIGHT

+ GAGE PRESSURE (IN FEET)

= 72.38 + 8.41 + .00 * 2.31 = 80.79

R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .0000001200 FT/MIN

K = .00000006 CM/SEC

P2/3 TEST

Q = INJECTION RATE = .00155665 (FEET³/MIN)

L = LENGTH OF TEST INTERVAL = 9.65 FEET

TEST INTERVAL IS ABOVE WATER TABLE

HEAD = DEPTH OF CENTER OF INTERVAL + GAGE HEIGHT

+ GAGE PRESSURE (IN FEET)

= 72.38 + 5.72 + 14.00 * 2.31 = 110.43

R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .0000009438 FT/MIN

K = .00000048 CM/SEC

2ND P1/3 TEST

Q = INJECTION RATE = .00031133 (FEET³/MIN)

L = LENGTH OF TEST INTERVAL = 9.65 FEET

TEST INTERVAL IS ABOVE WATER TABLE

HEAD = DEPTH OF CENTER OF INTERVAL + GAGE HEIGHT

+ GAGE PRESSURE (IN FEET)

= 72.38 + 7.92 + .00 * 2.31 = 80.29

R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .0000002596 FT/MIN

K = .00000013 CM/SEC

PACKER TEST ANALYSIS

WELL NO. 16-87BR

ROCKY FLATS PLANT; 903 PAD AREA JOB NO. 2029-17-02

DATE TESTED: 7/13/87 BY: J.B. BERGMAN

TEST INTERVAL (FEET BELOW G.S.): 69.55 - 79.20

MATERIAL TESTED: ARAPAHOE CLAYSTONE

DEPTH TO WATER (FEET BELOW G.S.): 103.08

$$K = \frac{Q}{2(\pi)(L)(H)} \ln\left(\frac{L}{R}\right)$$

1ST P1/3 TEST

Q = INJECTION RATE = .00097019 (FEET³/MIN)

L = LENGTH OF TEST INTERVAL = 9.65 FEET

TEST INTERVAL IS ABOVE WATER TABLE

HEAD = DEPTH OF CENTER OF INTERVAL + GAGE HEIGHT

+ GAGE PRESSURE (IN FEET)

= 74.38 + 7.51 + .00 * 2.31 = 81.89

R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .00000079 FT/MIN

K = .00000040 CM/SEC

P2/3 TEST

PACKER TEST ANALYSIS
WELL NO. 16-87BR
ROCKY FLATS PLANT; 903 PAD AREA JOB NO. 2029-17-02
DATE TESTED: 7/13/87 BY: J.B. BERGMAN
TEST INTERVAL (FEET BELOW G.S.): 79.05 - 88.70
MATERIAL TESTED: ARAPAHOE CLAYSTONE
DEPTH TO WATER (FEET BELOW G.S.): 103.08

$$K = \frac{Q}{2(\pi)(L)(H)} \ln\left(\frac{L}{R}\right)$$

1ST P1/3 TEST

Q = INJECTION RATE = .00190418 (FEET³/MIN)
L = LENGTH OF TEST INTERVAL = 9.65 FEET
TEST INTERVAL IS ABOVE WATER TABLE
HEAD = DEPTH OF CENTER OF INTERVAL + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)
= 83.88 + 7.85 + .00 * 2.31 = 91.72
R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .00000139 FT/MIN
K = .00000071 CM/SEC

P2/3 TEST

Q = INJECTION RATE = .00638589 (FEET³/MIN)
L = LENGTH OF TEST INTERVAL = 9.65 FEET
TEST INTERVAL IS ABOVE WATER TABLE
HEAD = DEPTH OF CENTER OF INTERVAL + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)
= 83.88 + 5.72 + 16.00 * 2.31 = 126.56
R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .00000338 FT/MIN
K = .00000172 CM/SEC

2ND P1/3 TEST

Q = INJECTION RATE = .00099915 (FEET³/MIN)
L = LENGTH OF TEST INTERVAL = 9.65 FEET
TEST INTERVAL IS ABOVE WATER TABLE
HEAD = DEPTH OF CENTER OF INTERVAL + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)
= 83.88 + 7.30 + .00 * 2.31 = 91.18
R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .00000073 FT/MIN
K = .00000037 CM/SEC

PACKER TEST ANALYSIS

WELL NO. 16-87BR

ROCKY FLATS PLANT; 903 PAD AREA JOB NO. 2029-17-02

DATE TESTED: 7/13/87 BY: J.B. BERGMAN

TEST INTERVAL (FEET BELOW G.S.): 88.70 - 98.35

MATERIAL TESTED: ARAPAHOE CLAYSTONE

DEPTH TO WATER (FEET BELOW G.S.): 103.08

$$K = \frac{Q}{2(P_i)(L)(H)} \ln\left(\frac{L}{R}\right)$$

1ST P1/3 TEST

Q = INJECTION RATE = .00000000 (FEET³/MIN)

L = LENGTH OF TEST INTERVAL = 9.65 FEET

TEST INTERVAL IS ABOVE WATER TABLE

HEAD = DEPTH OF CENTER OF INTERVAL + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)

= 93.52 + 8.31 + .00 * 2.31 = 101.83

R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .00000000 FT/MIN

K = .00000000 CM/SEC

P2/3 TEST

Q = INJECTION RATE = .00583563 (FEET³/MIN)

L = LENGTH OF TEST INTERVAL = 9.65 FEET

TEST INTERVAL IS ABOVE WATER TABLE

HEAD = DEPTH OF CENTER OF INTERVAL + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)

= 93.52 + 5.72 + 18.00 * 2.31 = 140.82

R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .00000277 FT/MIN

K = .00000141 CM/SEC

2ND P1/3 TEST

Q = INJECTION RATE = .00005792 (FEET³/MIN)

L = LENGTH OF TEST INTERVAL = 9.65 FEET

TEST INTERVAL IS ABOVE WATER TABLE

HEAD = DEPTH OF CENTER OF INTERVAL + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)

= 93.52 + 8.60 + .00 * 2.31 = 102.12

R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .00000004 FT/MIN

K = .00000002 CM/SEC

PACKER TEST ANALYSIS

WELL NO. 16-87BR

ROCKY FLATS PLANT; 903 PAD AREA

JOB NO. 2029-17-02

DATE TESTED: 7/13/87

BY: J.B. BERGMAN

TEST INTERVAL (FEET BELOW G.S.): 90.70 - 100.35

MATERIAL TESTED: ARAPAHOE CLAYSTONE

DEPTH TO WATER (FEET BELOW G.S.): 103.08

$$K = \frac{Q}{2(\pi)(L)(H)} \ln\left(\frac{L}{R}\right)$$

1ST P1/3 TEST

Q = INJECTION RATE = .00438035 (FEET³/MIN)

L = LENGTH OF TEST INTERVAL = 9.65 FEET

TEST INTERVAL IS ABOVE WATER TABLE

HEAD = DEPTH OF CENTER OF INTERVAL + GAGE HEIGHT

+ GAGE PRESSURE (IN FEET)

= 95.52 + 8.76 + .00 * 2.31 = 104.28

R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .0000028124 FT/MIN

K = .00000143 CM/SEC

P2/3 TEST

PACKER TEST ANALYSIS

WELL NO. 16-87BR

ROCKY FLATS PLANT; 903 PAD AREA

JOB NO. 2029-17-02

DATE TESTED: 7/13/87

BY: J.B. BERGMAN

TEST INTERVAL (FEET BELOW G.S.): 100.50 - 110.15

MATERIAL TESTED: ARAPAHOE SANDSTONE

DEPTH TO WATER (FEET BELOW G.S.): 103.08

$$K = \frac{Q}{2(\pi)(L)(H)} \ln\left(\frac{L}{R}\right)$$

1ST P1/3 TEST

Q = INJECTION RATE = .00044889 (FEET³/MIN)

L = LENGTH OF TEST INTERVAL = 9.65 FEET

TEST INTERVAL IS ABOVE WATER TABLE

HEAD = DEPTH OF CENTER OF INTERVAL + GAGE HEIGHT

+ GAGE PRESSURE (IN FEET)

= 105.32 + 8.20 + .00 * 2.31 = 113.52

R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .00000026 FT/MIN

K = .00000013 CM/SEC

P2/3 TEST

Q = INJECTION RATE = .00615420 (FEET³/MIN)

L = LENGTH OF TEST INTERVAL = 9.65 FEET

TEST INTERVAL IS ABOVE WATER TABLE

HEAD = DEPTH OF CENTER OF INTERVAL + GAGE HEIGHT

+ GAGE PRESSURE (IN FEET)

= 105.32 + 5.72 + 21.00 * 2.31 = 159.55

R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .00000258 FT/MIN

K = .00000131 CM/SEC

2ND P1/3 TEST

Q = INJECTION RATE = .00044889 (FEET³/MIN)

L = LENGTH OF TEST INTERVAL = 9.65 FEET

TEST INTERVAL IS ABOVE WATER TABLE

HEAD = DEPTH OF CENTER OF INTERVAL + GAGE HEIGHT

+ GAGE PRESSURE (IN FEET)

= 105.32 + 9.12 + .00 * 2.31 = 114.44

R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .00000026 FT/MIN

K = .00000013 CM/SEC

PACKER TEST ANALYSIS
WELL NO. 16-87BR
ROCKY FLATS PLANT; 903 PAD AREA JOB NO. 2029-17-02
DATE TESTED: 7/13/87 BY: J.B. BERGMAN
TEST INTERVAL (FEET BELOW G.S.): 109.72 - 119.37
MATERIAL TESTED: ARAPAHOE SANDSTONE
DEPTH TO WATER (FEET BELOW G.S.): 103.08

$$K = \frac{Q}{2(\pi)(L)(H)} \ln\left(\frac{L}{R}\right)$$

1ST P1/3 TEST

Q = INJECTION RATE = .00044165 (FEET³/MIN)
L = LENGTH OF TEST INTERVAL = 9.65 FEET
TEST INTERVAL IS BELOW WATER TABLE
HEAD = DEPTH TO WATER + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)
= 103.08 + 8.16 + .00 * 2.31 = 111.24
R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .00000027 FT/MIN
K = .00000014 CM/SEC

P2/3 TEST

Q = INJECTION RATE = .01198984 (FEET³/MIN)
L = LENGTH OF TEST INTERVAL = 9.65 FEET
TEST INTERVAL IS BELOW WATER TABLE
HEAD = DEPTH TO WATER + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)
= 103.08 + 5.72 + 24.00 * 2.31 = 164.24
R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .00000489 FT/MIN
K = .00000248 CM/SEC

2ND P1/3 TEST

Q = INJECTION RATE = .00068782 (FEET³/MIN)
L = LENGTH OF TEST INTERVAL = 9.65 FEET
TEST INTERVAL IS BELOW WATER TABLE
HEAD = DEPTH TO WATER + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)
= 103.08 + 8.29 + .00 * 2.31 = 111.37
R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .00000041 FT/MIN
K = .00000021 CM/SEC

PACKER TEST ANALYSIS

WELL NO. 16-87BR

ROCKY FLATS PLANT; 903 PAD AREA JOB NO. 2029-17-02

DATE TESTED: 7/13/87 BY: J.B. BERGMAN

TEST INTERVAL (FEET BELOW G.S.): 119.37 - 129.02

MATERIAL TESTED: ARAPAHOE CLAYSTONE

DEPTH TO WATER (FEET BELOW G.S.): 103.08

$$K = \frac{Q}{2(\pi)(L)(H)} \ln\left(\frac{L}{R}\right)$$

1ST P1/3 TEST

Q = INJECTION RATE = .00046338 (FEET3/MIN)

L = LENGTH OF TEST INTERVAL = 9.65 FEET

TEST INTERVAL IS BELOW WATER TABLE

HEAD = DEPTH TO WATER + GAGE HEIGHT

+ GAGE PRESSURE (IN FEET)

= 103.08 + 8.30 + .00 * 2.31 = 111.38

R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .00000028 FT/MIN

K = .00000014 CM/SEC

P2/3 TEST

Q = INJECTION RATE = .01965725 (FEET3/MIN)

L = LENGTH OF TEST INTERVAL = 9.65 FEET

TEST INTERVAL IS BELOW WATER TABLE

HEAD = DEPTH TO WATER + GAGE HEIGHT

+ GAGE PRESSURE (IN FEET)

= 103.08 + 5.72 + 26.00 * 2.31 = 168.86

R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .00000779 FT/MIN

K = .00000396 CM/SEC

2ND P1/3 TEST

Q = INJECTION RATE = .00047062 (FEET3/MIN)

L = LENGTH OF TEST INTERVAL = 9.65 FEET

TEST INTERVAL IS BELOW WATER TABLE

HEAD = DEPTH TO WATER + GAGE HEIGHT

+ GAGE PRESSURE (IN FEET)

= 103.08 + 8.57 + .00 * 2.31 = 111.65

R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .00000028 FT/MIN

K = .00000014 CM/SEC

PACKER TEST ANALYSIS

WELL NO. 16-87BR

ROCKY FLATS PLANT; 903 PAD AREA

JOB NO. 2029-17-02

DATE TESTED: 7/10/87

BY: J.B. BERGMAN

TEST INTERVAL (FEET BELOW G.S.): 129.02 - 138.67

MATERIAL TESTED: ARAPAHOE SANDSTONE

DEPTH TO WATER (FEET BELOW G.S.): 103.08

$$K = \frac{Q}{2(PI)(L)(H)} \ln\left(\frac{L}{R}\right)$$

1ST P1/3 TEST

Q = INJECTION RATE = .00099295 (FEET3/MIN)

L = LENGTH OF TEST INTERVAL = 9.65 FEET

TEST INTERVAL IS BELOW WATER TABLE

HEAD = DEPTH TO WATER + GAGE HEIGHT

+ GAGE PRESSURE (IN FEET)

= 103.08 + 7.90 + .00 * 2.31 = 110.98

R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .00000060 FT/MIN

K = .00000030 CM/SEC

P2/3 TEST

Q = INJECTION RATE = .00491819 (FEET3/MIN)

L = LENGTH OF TEST INTERVAL = 9.65 FEET

TEST INTERVAL IS BELOW WATER TABLE

HEAD = DEPTH TO WATER + GAGE HEIGHT

+ GAGE PRESSURE (IN FEET)

= 103.08 + 5.72 + 28.00 * 2.31 = 173.48

R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .00000190 FT/MIN

K = .00000096 CM/SEC

2ND P1/3 TEST

Q = INJECTION RATE = .00078350 (FEET3/MIN)

L = LENGTH OF TEST INTERVAL = 9.65 FEET

TEST INTERVAL IS BELOW WATER TABLE

HEAD = DEPTH TO WATER + GAGE HEIGHT

+ GAGE PRESSURE (IN FEET)

= 103.08 + 7.97 + .00 * 2.31 = 111.05

R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .00000047 FT/MIN

K = .00000024 CM/SEC

PACKER TEST ANALYSIS

WELL NO. 16-87BR

ROCKY FLATS PLANT; 903 PAD AREA

JOB NO. 2029-17-02

DATE TESTED: 7/10/87

BY: J.B. BERGMAN

TEST INTERVAL (FEET BELOW G.S.): 131.02 - 140.67

MATERIAL TESTED: ARAPAHOE SANDSTONE

DEPTH TO WATER (FEET BELOW G.S.): 103.08

$$K = \frac{Q}{2(\pi)(L)(H)} \ln\left(\frac{L}{R}\right)$$

1ST P1/3 TEST

Q = INJECTION RATE = .00000776 (FEET³/MIN)

L = LENGTH OF TEST INTERVAL = 9.65 FEET

TEST INTERVAL IS BELOW WATER TABLE

HEAD = DEPTH TO WATER + GAGE HEIGHT

+ GAGE PRESSURE (IN FEET)

= 103.08 + 8.10 + .00 * 2.31 = 111.18

R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .0000000047 FT/MIN

K = .00000000 CM/SEC

P2/3 TEST

PACKER TEST ANALYSIS

WELL NO. 16-87BR

ROCKY FLATS PLANT; 903 PAD AREA JOB NO. 2029-17-02

DATE TESTED: 7/10/87 BY: J.B. BERGMAN

TEST INTERVAL (FEET BELOW G.S.): 134.94 - 144.59

MATERIAL TESTED: ARAPAHOE CLAYSTONE

DEPTH TO WATER (FEET BELOW G.S.): 103.08

$$K = \frac{Q}{2(\pi)(L)(H)} \ln\left(\frac{L}{R}\right)$$

1ST P1/3 TEST

Q = INJECTION RATE = .00000078 (FEET³/MIN)

L = LENGTH OF TEST INTERVAL = 9.65 FEET

TEST INTERVAL IS BELOW WATER TABLE

HEAD = DEPTH TO WATER + GAGE HEIGHT

+ GAGE PRESSURE (IN FEET)

= 103.08 + 8.26 + .00 * 2.31 = 111.34

R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .0000000005 FT/MIN

K = .00000000 CM/SEC

P2/3 TEST

PACKER TEST ANALYSIS

WELL NO. 16-87BR

ROCKY FLATS PLANT; 903 PAD AREA JOB NO. 2029-17-02

DATE TESTED: 7/10/87 BY: J.B. BERGMAN

TEST INTERVAL (FEET BELOW G.S.): 144.71 - 154.36

MATERIAL TESTED: ARAPAHOE CLAYSTONE

DEPTH TO WATER (FEET BELOW G.S.): 103.08

$$K = \frac{Q}{2(\pi)(L)(H)} \ln\left(\frac{L}{R}\right)$$

1ST P1/3 TEST

Q = INJECTION RATE = .00054302 (FEET³/MIN)

L = LENGTH OF TEST INTERVAL = 9.65 FEET

TEST INTERVAL IS BELOW WATER TABLE

HEAD = DEPTH TO WATER + GAGE HEIGHT

+ GAGE PRESSURE (IN FEET)

= 103.08 + 7.77 + .00 * 2.31 = 110.85

R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .00000033 FT/MIN

K = .00000017 CM/SEC

P2/3 TEST

PACKER TEST ANALYSIS

WELL NO. 16-87BR

ROCKY FLATS PLANT; 903 PAD AREA JOB NO. 2029-17-02

DATE TESTED: 7/10/87 BY: J.B. BERGMAN

TEST INTERVAL (FEET BELOW G.S.): 146.71 - 156.36

MATERIAL TESTED: ARAPAHOE CLAYSTONE

DEPTH TO WATER (FEET BELOW G.S.): 103.08

$$K = \frac{Q}{2(\pi)(L)(H)} \ln\left(\frac{L}{R}\right)$$

1ST P1/3 TEST

Q = INJECTION RATE = .00106276 (FEET³/MIN)

L = LENGTH OF TEST INTERVAL = 9.65 FEET

TEST INTERVAL IS BELOW WATER TABLE

HEAD = DEPTH TO WATER + GAGE HEIGHT

+ GAGE PRESSURE (IN FEET)

= 103.08 + 8.19 + .00 * 2.31 = 111.27

R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .00000064 FT/MIN

K = .00000032 CM/SEC

P2/3 TEST

PACKER TEST ANALYSIS

WELL NO. 16-87BR

ROCKY FLATS PLANT; 903 PAD AREA

JOB NO. 2029-17-02

DATE TESTED: 7/9/87

BY: J.B. BERGMAN

TEST INTERVAL (FEET BELOW G.S.): 151.35 - 161.00

MATERIAL TESTED: ARAPAHOE CLAYSTONE

DEPTH TO WATER (FEET BELOW G.S.): 103.08

$$K = \frac{Q}{2(\pi)(L)(H)} \ln\left(\frac{L}{R}\right)$$

1ST P1/3 TEST

Q = INJECTION RATE = .00009309 (FEET³/MIN)

L = LENGTH OF TEST INTERVAL = 9.65 FEET

TEST INTERVAL IS BELOW WATER TABLE

HEAD = DEPTH TO WATER + GAGE HEIGHT

+ GAGE PRESSURE (IN FEET)

= 103.08 + 9.64 + .00 * 2.31 = 112.72

R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .0000000553 FT/MIN

K = .00000003 CM/SEC

P2/3 TEST

PACKER TEST ANALYSIS

WELL NO. 16-87BR

ROCKY FLATS PLANT; 903 PAD AREA

JOB NO. 2029-17-02

DATE TESTED: 7/9/87

BY: J. B. BERGMAN

TEST INTERVAL (FEET BELOW G.S.): 153.35 - 163.00

MATERIAL TESTED: ARAPAHOE SANDSTONE

DEPTH TO WATER (FEET BELOW G.S.): 103.08

$$K = \frac{Q}{2(\pi)(L)(H)} \ln\left(\frac{L}{R}\right)$$

1ST P1/3 TEST

Q = INJECTION RATE = .00008533 (FEET³/MIN)

L = LENGTH OF TEST INTERVAL = 9.65 FEET

TEST INTERVAL IS BELOW WATER TABLE

HEAD = DEPTH TO WATER + GAGE HEIGHT

+ GAGE PRESSURE (IN FEET)

= 103.08 + 9.37 + .00 * 2.31 = 112.45

R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .0000000508 FT/MIN

K = .00000003 CM/SEC

P2/3 TEST

PACKER TEST DATA SHEET

Job No.: 2029-17-02

Static Water Level: 103.08'

Location: Rocky Flats Plant; 903 Pad Area

Date of Water Level: 10/26/87

Well No.: 16-87BR

Page 1 of 4

Borehole Diameter: 0.333'

Comments: Test Intervals # 1-11, 16, 19, 21, 23 failed on

Acrylic Tube Diameter: 0.1663'

2/3 pressure test due to improper packer seal.

Test Interval No.	Top of Test Interval	Bottom of Test Interval	Test Length (minutes)	Gage Pressure	Gage Height	Avg. H ₂ O Height	Gage Height + Avg. H ₂ O Height	Δh	Date of Test	Lithology	Geologist
1	153.35	163.00	14	0	5.72	3.65	9.37'	0.055	7/9/87	Kass	JBB
			-	33.83	5.72	-	-	-	7/9/87	Kass	JBB
			-	-	5.72	-	-	-	7/9/87	Kass	JBB
2	151.35	161.00	14	0	5.72	3.92	9.64	0.06	7/9/87	KCL	JBB
			-	-	5.72	-	-	-	7/9/87	KCL	JBB
			-	-	5.72	-	-	-	7/9/87	KCL	JBB
3	149.35	159.00	14	0	5.72	3.20	8.92	0.00	7/9/87	KCL	JBB
			-	-	5.72	-	-	-	7/9/87	KCL	JBB
			-	-	5.72	-	-	-	7/9/87	KCL	JBB
4	146.71	156.36	14	0	5.72	2.47	8.19	0.685	7/10/87	KCL	JBB
			-	-	5.72	-	-	-	7/10/87	KCL	JBB
			-	-	5.72	-	-	-	7/10/87	KCL	JBB
5	144.71	154.36	14	0	5.72	2.05	7.77	0.35	7/10/87	KCL	JBB
			-	-	5.72	-	-	-	7/10/87	KCL	JBB
			-	-	5.72	-	-	-	7/10/87	KCL	JBB
6	142.21	151.86	14	0	5.72	2.90	8.62	0.00	7/10/87	KCL	JBB
			-	-	5.72	-	-	-	7/10/87	KCL	JBB
			-	-	5.72	-	-	-	7/10/87	KCL	JBB

PACKER TEST DATA SHEET

Job No.: 2029-17-02

Static Water Level: 103.08'

Location: Rocky Flats Plant; 903 Pad Area

Date of Water Level: 10/25/87

Well No.: 16-87BR (CON'T)

Page 2 of 4

Comments:

Borehole Diameter: 0.333'

Acrylic Tube Diameter: 0.1663'

Test Interval No.	Top of Test Interval	Bottom of Test Interval	Test Length (minutes)	Gage Pressure	Gage Height	Avg. H ₂ O Height	Gage Height + Avg. H ₂ O Height	Δh	Date of Test	Lithology	Geologist
7	140.21	149.86	14	0	5.72	1.99	7.71	0.00	7/10/87	KCL	JBP
			-	-	5.72	-	-	-	7/10/87	KCL	JBP
			-	-	5.72	-	-	-	7/10/87	KCL	JBP
8	136.94	146.59	14	0	5.72	2.40	8.12	0.00	7/10/87	KCL	JBP
			-	-	5.72	-	-	-	7/10/87	KCL	JBP
			-	-	5.72	-	-	-	7/10/87	KCL	JBP
9	134.94	144.59	14	0	5.72	2.54	8.26	0.005	7/10/87	KCL	JBP
			-	-	5.72	-	-	-	7/10/87	KCL	JBP
			-	-	5.72	-	-	-	7/10/87	KCL	JBP
10	132.94	142.59	14	0	5.72	2.45	8.17	0.00	7/10/87	Kass	JBP
			-	-	5.72	-	-	-	7/10/87	Kass	JBP
			-	-	5.72	-	-	-	7/10/87	Kass	JBP
11	131.02	140.67	14	0	5.72	2.38	8.10	0.005	7/10/87	Kass	JBP
			-	-	5.72	-	-	-	7/10/87	Kass	JBP
			-	-	5.72	-	-	-	7/10/87	Kass	JBP
12	129.02	138.67	14	0	5.72	1.18	7.90	0.64	7/10/87	Kass	JBP
			14	28	5.72	N/A	5.72	3.17	7/10/87	Kass	JBP
			14	0	5.72	2.25	7.97	0.505	7/10/87	Kass	JBP

PACKER TEST DATA SHEET

Job No.: 2029-17-02

Static Water Level: 103.08'

Location: Rocky Flats Plant; 903 Pad Area

Date of Water Level: 10/26/87

Well No.: 16-87BR (CON'T)

Page 3 of 4

Borehole Diameter: 0.333'

Comments:

Acrylic Tube Diameter: 0.1663'

Test Interval No.	Top of Test Interval	Bottom of Test Interval	Test Length (minutes)	Gage Pressure	Gage Height	Avg. H ₂ O Height	Gage Height + Avg. H ₂ O Height	Δh	Date of Test	Lithology	Geologist
13	119.37	129.02	15	0	5.72	2.58	8.30	0.32	7/13/87	KCL	JBB
			15	26	5.72	N/A	5.72	13.575	7/13/87	KCL	JBB
			15	0	5.72	2.85	8.57	0.325	7/13/87	KCL	JBB
14	109.72	119.37	15	0	5.72	2.44	8.16	0.305	7/13/87	Kass	JBB
			15	24	5.72	N/A	5.72	8.28	7/13/87	Kass	JBB
			15	0	5.72	2.57	8.29	0.475	7/13/87	Kass	JBB
15	100.50	110.15	15	0	5.72	2.48	8.20	0.31	7/13/87	Kass	JBB
			15	21	5.72	N/A	5.72	4.25	7/13/87	Kass	JBB
			15	0	5.72	3.40	9.12	0.31	7/13/87	Kass	JBB
16	90.70	100.35	15	0	5.72	3.04	8.76	3.025	7/13/87	KCL	JBB
			-	-	5.72	-	-	-	7/13/87	KCL	JBB
			-	-	5.72	-	-	-	7/13/87	KCL	JBB
17	88.70	98.35	15	0	5.72	2.59	8.31	0.0	7/13/87	KCL	JBB
			15	18	5.72	N/A	5.72	4.03	7/13/87	KCL	JBB
			15	0	5.72	2.88	8.60	0.04	7/13/87	KCL	JBB
18	79.05	88.70	15	0	5.72	2.13	7.85	1.315	7/13/87	KCL	JBB
			15	16	5.72	N/A	5.72	4.41	7/13/87	KCL	JBB
			15	0	5.72	1.58	7.30	0.69	7/13/87	KCL	JBB

Job No.: 2029-17-02

Location: Rocky Flats Plant; 903 Pad Area

Well No.: 16-87BR (CON'T)

Borehole Diameter: 0.333

Comments:

Acrylic Tube Diameter: 0.1663

Static Water Level: 103.08'

Date of Water Level: 10/26/87

Page 4 of 4[illegible]

12.11/87

Water Level Data
for
Rockwell (Rocky Flats)

<u>Date Measured</u>	<u>Depth to Water from TOC</u>	<u>Elevation TOC (ft)</u>	<u>Water Level Elev. (ft)</u>
--------------------------	------------------------------------	-------------------------------	-----------------------------------

** Well Number: 1687BR

09 29/87	104.30	5970.98	5866.68
12/01/87	85.47	5970.98	5885.51

INDEX OF DATA

Boring No.: 17-87

Completed as well? Yes

Data in File

- ☒ Log of Borehole
- ☒ Well Construction Summaries
- ☐ Well Development Summaries
- ☒ Hydraulic Conductivity Test Data
and Results
- ☐ Packer Test Data and Results
- ☒ Water Level Data

LOG OF BOREHOLE

Location Rocky Flats Plant; Mound Area
Coordinates N 36424.92 E 23200.70
Total Depth 30.30'

Drilling Company Boyles Bros
Date Drilled September 9, 1987
Drilling Method Hollow Stem Auger
Logged By R.T. Treat
Geologist

Borehole/Well No. 17-87
Ground Surface Elevation 5965.56
Water Level Encountered None
Static 5951.20' (12/01/87)
Driller R. Sharp
Helper S. Bradfield
Drilling Fluid None
Checked By A. Pasella
Site Manager
Brent Jones
CEARP Manager

Comments _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
0			TOPSOIL 0.0-2.0' SAMPLE. Recovered 1.6/2.0'=80%. 0-0.3': TOPSOIL: organic roots with some silty sands.	HNU Background=0.6 OVA Background=0.0 Ludlum Background=0.0
5			ROCKY FLATS ALLUVIUM 0.3-2.0': CLAYEY GRAVELS: grayish brown (5 YR 3/2) quartzite gravels; angular, with angular and subangular cobbles; slightly sandy; poorly sorted; massive; moist.	3.5-5.0': Readings on core: HNU = 1.2; OVA = 0.0.
10			2.0-3.5' SAMPLE. Recovered 1.5/1.5' = 100%. GRAVEL AND CLAYEY SAND: moderate orange pink (5 YR 8/4); weakly cemented; very calcareous; sands 2.5-2.0 phi up to 0.5mm to 3.0mm gravels; scattered quartzite cobbles; angular and subangular; poorly sorted; slightly moist.	5.0-6.5': Readings on core: HNU = 0.0; OVA = 1.8.
15			3.5-5.0' SAMPLE. Recovered 0.8/1.5'=53%. SANDY GRAVELS: very pale orange (10 YR 8/2) to grayish orange (10 YR 7/4); scattered quartzite gravel and cobbles up to 7.0mm; sands (2.0-1.5 phi) poorly sorted, angular to subangular; slightly to moderately calcareous; weakly cemented; slightly moist.	
20				

LOG OF BOREHOLE

Location Rocky Flats Plant; Mound Area
Coordinates N 36424.92 E 23200.70
Total Depth 30.30'

Borehole/Well No. 17-87
Ground Surface Elevation 5965.56
Water Level Encountered None
Static 5951.20' (12/01/87)

Drilling Company Boyles Bros
Date Drilled September 9, 1987
Drilling Method Hollow Stem Auger
Logged By R.T. Treat
Geologist

Driller R. Sharp
Helper S. Bradfield
Drilling Fluid None
Checked By J. Pasche
Site Manager

CEARP Manager

Comments

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
20			<u>5.0-6.5' SAMPLE.</u> Recovered 1.5/1.5' = 100%. SAND AND GRAVEL: grayish orange (10 YR 7/4); quartzite gravel and cobbles from 0.5 to 2.5mm; sand 1.5-1.0 phi, weakly cemented; poorly sorted; angular and subangular sand and gravel; slightly moist.	
25			<u>6.5-8.0' SAMPLE.</u> No recovery. Drilled with center bit.	
			<u>8.0-9.5' SAMPLE.</u> Recovered 1.2/1.5' = 80%. SAND AND GRAVEL: moderate brown (5 YR 4/4) to light brown (5 YR 6/4); quartzite gravel and cobbles from 0.5 to 2.5mm; sand 1.5-1.0 phi; poorly sorted; slightly clayey; angular and subangular sand and gravel; weakly cemented; slightly calcareous; slightly moist.	
30			<u>9.5-10.0' SAMPLE.</u> No recovery. Drilled with center bit.	
			<u>10.0-12.0' SAMPLE.</u> Recovered 2.0/2.0' = 100%. SAND AND GRAVEL: same as above; moist.	
35			<u>12.0-14.0' SAMPLE.</u> Recovered 1.15/2.0' = 58%. SAND AND GRAVEL: same as above with fewer gravels; moist to slightly moist.	

LOG OF BOREHOLE

Location Rocky Flats Plant; Mound Area
Coordinates N 36424.92 E 23200.70
Total Depth 30.30'

Drilling Company Boyles Bros
Date Drilled September 9, 1987
Drilling Method Hollow Stem Auger
Logged By R.T. Treat
Geologist

Borehole/Well No. 17-87
Ground Surface Elevation 5965.56
Water Level Encountered None
Static 5951.20' (12/01/87)
Driller R. Sharp
Helper S. Bradfield
Drilling Fluid None
Checked By [Signature]
Site Manager
CEARP Manager

Comments _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			<u>14.0-16.0' SAMPLE.</u> Recovered 0.9/2.0' = 45%. SAND AND GRAVEL: light brown (5 YR 5/6); scattered gravels up to 7.0mm; sub-angular to subrounded; sand 2.0-1.5 phi; poorly sorted; slightly moist.	
			<u>16.0-18.0' SAMPLE.</u> Recovered 0.8/2.0' = 40%. SAND AND GRAVEL: same as above; slightly moist.	
			<u>18.0-19.3' SAMPLE.</u> Recovered 1.3/1.3' = 100%. CLAYEY SAND AND GRAVEL: pale yellowish brown (10 YR 6/2) to light brown (5 YR 6/6); sand 2.0-1.5 phi; gravel up to 5.5mm; poorly sorted; angular to subrounded; weakly cemented; moist.	
			<u>19.3-20.3' SAMPLE.</u> Recovered 1.0/1.0' = 100%. CLAYEY SAND AND GRAVEL: same as above; moist to slightly moist.	
			<u>20.3-22.3' SAMPLE.</u> Recovered 0.95/2.0' = 48%. SAND AND GRAVEL: grayish orange (10 YR 7/4); sand 3.0-2.5 phi; scattered gravels up to 4.5mm; subangular to subrounded; some silt; poorly sorted; weakly cemented; slightly moist.	

LOG OF BOREHOLE

Location Rocky Flats Plant; Mound Area
Coordinates N 36424.92 E 23200.70
Total Depth 30.30'

Drilling Company Boyles Bros
Date Drilled September 9, 1987
Drilling Method Hollow Stem Auger
Logged By R.T. Treat
Geologist

Borehole/Well No. 17-87
Ground Surface Elevation 5965.56
Water Level Encountered None
Static 5951.20' (12/01/87)
Driller R. Sharp
Helper S. Bradfield
Drilling Fluid None
Checked By [Signature]
Site Manager

CEARP Manager

Comments _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			<p><u>22.3-24.3' SAMPLE.</u> Recovered 1.3/2.0' = 65%. CLAYEY SAND AND GRAVEL: same as above with finer grained sands; slightly moist.</p> <p><u>24.3-26.3' SAMPLE.</u> Recovered 1.6/2.0' = 80%. 24.3-25.0': SAND AND GRAVEL: pale brown (5 YR 5/2); fine-grained sand; scattered gravels up to 1.5mm; slightly moist.</p> <p><u>ARAPAHOE FORMATION</u></p> <p>25.0-26.3': SANDY CLAYSTONE: dark yellowish orange (10 YR 6/6); weathered; very sandy; FeO staining; moist.</p> <p><u>26.3-28.3' SAMPLE.</u> Recovered 2.0/2.0' = 100%. CLAYSTONE: pale yellowish orange (10 YR 8/6) to dark yellowish orange (10 YR 6/6); some sand; moderately consolidated; cemented; massive; severe FeO stains; moist.</p> <p><u>28.3-30.3' SAMPLE.</u> Recovered 2.0/2.0' = 100%. CLAYSTONE: medium gray (N 5/0); massive; FeO stained; moist.</p> <p>TOTAL DEPTH: 30.30'</p>	

WELL COMPLETION INFORMATION

Location Rocky Flats Plant; Mound Area

Coordinates N 36424.92 E 23200.70

Total Depth: Well 25.75'

Borehole 32.30'

Well No. 17-87

Elevation: Ground Surface 5967.56'

Top of Casing 5969.53'

Formation of Completion Rocky Flats Alluvium

Casing Material Sch 5, type 316 TFJ stainless steel

Screen Material 0.010" wire wrap, type TFJ stainless steel

Date Installed Sept. 10, 1987

Installed By R.T. Treat
Geologist

Casing Diameter 2" ID

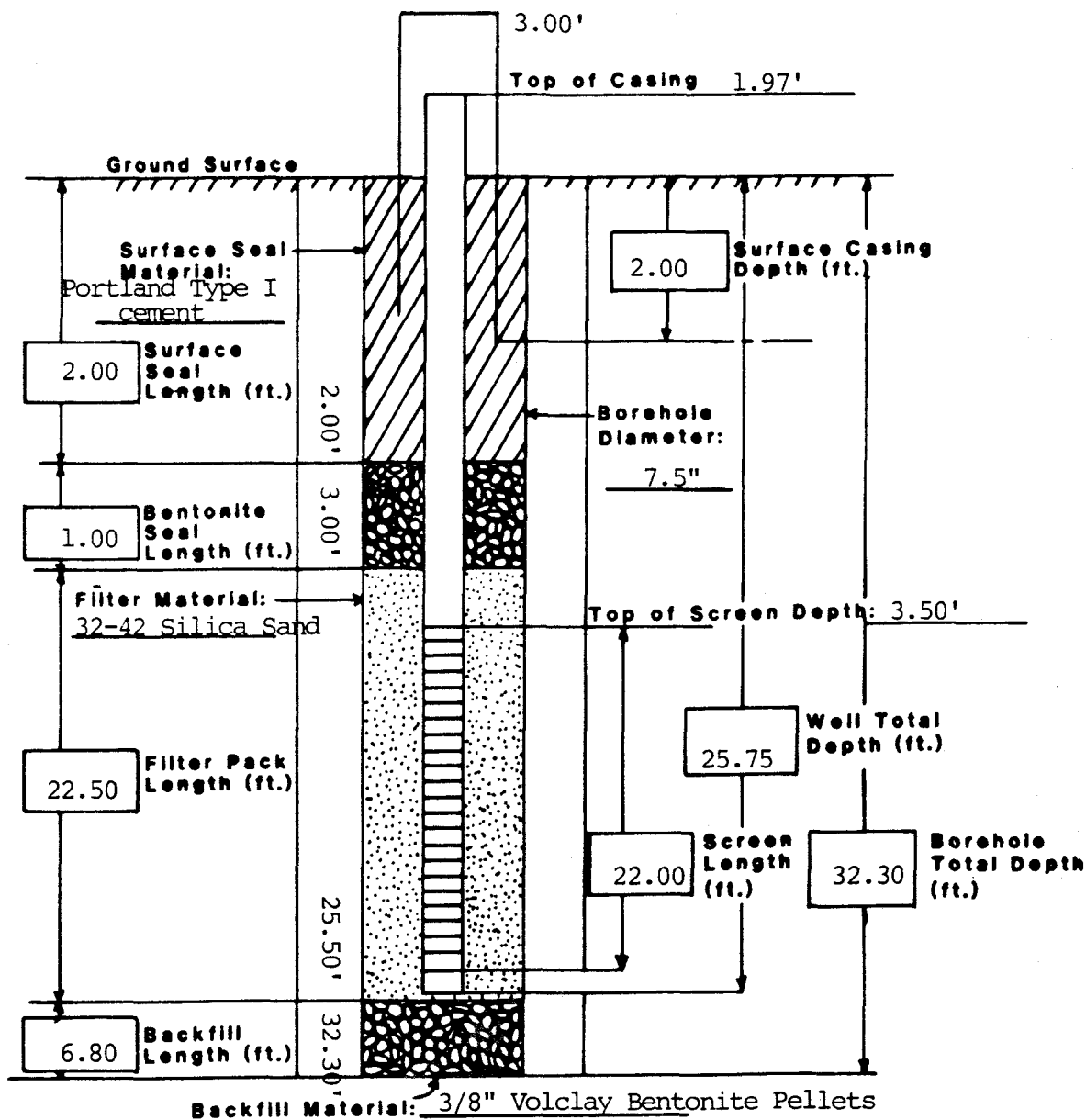
Surface Casing Diameter 5" ID

Approved By [Signature]

Site Manager

CEARP Manager

Comments Centralizer from 15.50' to 16.65'.



PROGRAM SLUGT, VERSION 4, OCT. 1985

THIS PROGRAM CALCULATES MEAN TRANSMISSIVITIES FROM SLUG-TEST DATA BASED ON TWO ANALYTICAL APPROACHES:

- (1) METHOD OF COOPER, BREDEHDEFT AND PAPADOPOULOS, 1967 (ARTICLE IN VOL.3, NO.1 OF WRR ENTITLED "RESPONSE OF A FINITE DIAMETER WELL TO AN INSTANTANEOUS CHARGE OF WATER")
- (2) METHOD OF BOWMER AND RICE, 1976 (ARTICLE IN VOL. 12, NO.3 OF WRR ENTITLED "A SLUG TEST FOR DETERMINING HYDRAULIC CONDUCTIVITY OF UNCONFINED AQUIFERS WITH COMPLETELY OR PARTIALLY PENETRATING WELLS")

PROJECT NO.: 6-011B-87

CLIENT: Rockwell International

ITE LOCATION: Rocky Flats Plant

DATE OF SLUG TEST: 10-14-87

FIELD INVESTIGATOR: Kevin McNeill

WELL NO.: 17-87

INPUT DATA ARE:

INNER CASING DIAMETER = 2.00 INCHES

LENGTH OF SCREEN OR INTAKE PORTION = 7.15 FEET

INNER SCREEN OR OPEN-HOLE DIAMETER = 2.00 INCHES

DEPTH FROM STATIC LEVEL TO BOTTOM OF SCREEN = 7.15 FEET

DIAMETER OF DRILLED HOLE = 7.50 INCHES

THICKNESS OF SATURATED AQUIFER ZONE = 7.15 FEET

ESTIMATED POROSITY OF GRAVEL PACK = .25

FALLING-HEAD INDEX = 0 ("1" IF FALLING, "0" IF RISING)

NUMBER OF HEAD-TIME DATA POINTS = 41

TIME (sec)	HEAD (FEET)
1.00	.640
2.00	.630
3.00	.630
4.00	.630
5.00	.620
6.00	.620
7.00	.610
8.00	.610
9.00	.610
10.00	.610
11.00	.610
12.00	.600
13.00	.600
14.00	.600
15.00	.590
30.00	.570
45.00	.550
60.00	.540
75.00	.530
90.00	.520
105.00	.510
120.00	.500
135.00	.490
150.00	.480
165.00	.480
180.00	.470
210.00	.460
240.00	.450
270.00	.440
300.00	.430
360.00	.420
420.00	.410
525.00	.400
645.00	.390
765.00	.380
885.00	.370
1005.00	.370
1245.00	.360
1485.00	.360
1725.00	.350
2205.00	.350

HO WAS COMPUTED FROM INTERCEPT OF PLOT OF LOG(H) VS. TIME

SUCCESSIVE COMPUTED
VALUES FOR HO
(FEET)

.5535
.5606

METHOD OF BOUWER AND RICE

COMPUTED RESULTS USING DIAMETER OF DRILLED HOLE:

PERMEABILITY = $1.98\text{E-}06$ FT/sec = $6.02\text{E-}05$ CM/sec

TRANSMISSIVITY = $1.41\text{E-}05$ FT**2/sec

COMPUTED RESULTS USING DIAMETER OF CASING AND SCREEN:

PERMEABILITY = $6.81\text{E-}07$ FT/sec = $2.08\text{E-}05$ CM/sec

TRANSMISSIVITY = $4.87\text{E-}06$ FT**2/sec

12/11/87

Water Level Data
for
Rockwell (Rocky Flats)

<u>Date Measured</u>	<u>Depth to Water from TOC</u>	<u>Elevation TOC (ft)</u>	<u>Water Level Elev. (ft)</u>
** Well Number: 1787			
12/01/87	18.33	5969.53	5951.20

INDEX OF DATA

Boring No.: 17-87A

Completed as well? No

Data in File

- ☒ Log of Borehole
- ☐ Well Construction Summaries
- ☐ Well Development Summaries
- ☐ Hydraulic Conductivity Test Data
and Results
- ☐ Packer Test Data and Results
- ☐ Water Level Data

LOG OF BOREHOLE

Location Rocky Flats Plant; Mound Area
Coordinates N 35411.09 E 23200.36
Total Depth 26.30'

Borehole/Well No. 17-87A
Ground Surface Elevation 5967.58'
Water Level Encountered None
Static N/A

Drilling Company Boyles Bros
Date Drilled August 6-7, 1987
Drilling Method Hollow Stem Auger
Logged By J. B. Bergman
Geologist

Driller T. Merritt
Helper J. Duncan
Drilling Fluid None
Checked By [Signature]

Comments Core barrel and overshot rod stuck in hole. Rotary drill moved on hole to try to retrieve. Abandoned hole for now.

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
0			<u>TOPSOIL</u>	
			<u>0.0-2.0' SAMPLE.</u> Recovered 2.0/2.0' = 100%. 0.0-0.9': TOP SOIL: moderate brown (5 YR 3/4); sand and clay with abundant quartzite gravels; unconsolidated; poorly sorted; abundant roots and grasses; dry.	HNu Background=0.4 OVA Background=0.0
5			<u>ROCKY FLATS ALLUVIUM</u>	
			0.9-2.0': SAND AND GRAVEL: moderate brown (5 YR 3/4); abundant caliche-reacts strongly with HCl; abundant quartzite gravels; angular; unconsolidated; medium-grained sand; dry.	
10			<u>2.0-4.0' SAMPLE.</u> Recovered 2.0/2.0' = 100%. SAND AND GRAVEL: pale yellowish brown (10 YR 6/2); very fine-grained to fine-grained sand; abundant quartzite gravels; angular; abundant caliche-reacts strongly with HCl; unconsolidated; poorly sorted; dry.	
15			<u>4.0-4.5' SAMPLE.</u> Recovered 0.4/0.5' = 80%. SAND AND GRAVEL: same as above; dry.	
			<u>4.5-5.5' SAMPLE.</u> No recovery. Drilled with center bit.	
20				20.0': Readings in well head: HNu = 0.8; OVA = 0.6.

LOG OF BOREHOLE

Location Rocky Flats Plant: Mound Area
Coordinates N 35411.09 E 23200.36
Total Depth 26.30'

Drilling Company Boyles Bros
Date Drilled August 6-7, 1987
Drilling Method Hollow Stem Auger
Logged By J. B. Bergman
Geologist

Borehole/Well No. 17-87A
Ground Surface Elevation 5967.58'
Water Level Encountered None
Static N/A
Driller T. Merritt
Helper J. Duncan
Drilling Fluid None
Checked By J. Pasella
Site Manager

Comments Core barrel and overshot rod stuck in hole. Rotary drill moved on
hole to try to retrieve. Abandoned hole for now.

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
20			<u>5.5-6.0' SAMPLE.</u> Recovered 0.5/0.5' = 100%. SAND AND GRAVEL: pale yellowish brown (10 YR 6/2); very fine-grained sand; quartzite gravels; poorly sorted; unconsolidated; dry.	
25			Readjust depth after hole caved 1.2'. <u>4.8-6.8' SAMPLE.</u> Recovered 2.0/2.0' = 100%. SAND AND GRAVEL: grayish orange pink (5 YR 7/2) sand matrix with abundant quartzite gravels; poorly sorted; unconsolidated; angular to subrounded; very fine-grained sand; abundant caliche-reacts strongly with HCl; dry.	
30			<u>6.8-9.8' SAMPLE.</u> Recovered 2.0/3.0' = 67%. SAND AND GRAVEL: pale yellowish brown (10 YR 6/2) sand matrix; abundant quartzite gravels and pebbles; poorly sorted; unconsolidated; angular to subrounded; very fine-grained sand; abundant caliche-reacts strongly with HCl; dry.	
			<u>9.8-11.8' SAMPLE.</u> No recovery.	
			<u>11.8-13.8' SAMPLE.</u> No recovery.	

LOG OF BOREHOLE

Location Rocky Flats Plant; Mound Area
Coordinates N 35411.09 E 23200.36
Total Depth 26.30'

Drilling Company Boyles Bros
Date Drilled August 6-7, 1987
Drilling Method Hollow Stem Auger
Logged By J. B. Bergman
Geologist

Borehole/Well No. 17-87A
Ground Surface Elevation 5967.58'
Water Level Encountered None
Static N/A
Driller T. Merritt
Helper J. Duncan
Drilling Fluid None
Checked By J. P. Passella
Site Manager

Comments Core barrel and overshot rod stuck in hole. Rotary drill moved on
hole to try to retrieve. Abandoned hole for now.

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			<u>13.8-16.8' SAMPLE.</u> Recovered 1.5/3.0' = 50%. SAND AND GRAVEL: pale yellowish brown (10 YR 6/2) sand matrix with abundant quartzite gravels and pebbles; poorly sorted; very fine-grained sand; abundant caliche-reacts strongly with HCl; dry.	
			<u>16.8-18.8' SAMPLE.</u> No recovery.	
			<u>18.8-23.3' SAMPLE.</u> No recovery.	
			<u>23.3-26.3' SAMPLE.</u> Recovered 5.0/3.0' = 167%. 23.3-25.9': SANDY CLAY AND GRAVEL: pale yellowish brown (10 YR 6/2) sandy clay matrix; abundant quartzite gravels; rounded; poorly sorted; unconsolidated; very fine-grained sand; wet.	
			<u>ARAPAHOE FORMATION</u>	
			25.9-26.3': CLAYSTONE: moderate olive brown (5 Y 4/4); consolidated; homogeneous; weathered; dry.	
			TOTAL DEPTH: 26.30'	

INDEX OF DATA

Boring No.: 18-87BR

Completed as well? Yes

Data in File

- ☒ Log of Borehole
- ☒ Well Construction Summaries
- ☐ Well Development Summaries
- ☐ Hydraulic Conductivity Test Data
and Results
- ☒ Packer Test Data
- ☒ Water Level Data

LOG OF BOREHOLE

Location Rocky Flats Plant; Mound Area
Coordinates N 36413.74 E 23231.24
Total Depth 148.00'

Borehole/Well No. 18-87BR
Ground Surface Elevation 5967.38'
Water Level Encountered 16.8'
Static 5939.13' (12/01/87)

Drilling Company Boyles Bros
Date Drilled August 5-6, : August 18-20, 1987
Drilling Method Hollow Stem Auger; Rotary Core
Logged By L.A. Gregory-Frost; K.D. Holliday
Geologist

Driller T. High; P. Bushkovski
Helper R. Sharp; K. Parker
Drilling Fluid None: 0.0 - 54.0'
Water: 54.0 - 148.0'
Checked By Brent Kern
Site Manager
CEARP Manager

Comments Surface casing set to 52.7' August 10, 1987 by L.A. Gregory-Frost

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
0			<u>TOPSOIL</u>	
			<u>0.0-2.0' SAMPLE.</u> Recovered 1.8/2.0' = 90%. 0.0-0.4': SANDY TOPSOIL: moderate brown (5 YR 3/4); rooted; grasses; occasional subangular quartzite pebbles; slightly calcareous; unconsolidated; dry. 0.4-1.8': GRAVELLY TOPSOIL: grayish brown (5 YR 3/2); sandy gravel; quartzite pebbles and cobbles; angular to subangular; up to 0.25' diameter; calcareous; unconsolidated; dry.	HNu Background=0.4 OVA Background=0.2 No readings over background.
5				
			<u>ROCKY FLATS ALLUVIUM</u>	
			1.8-2.0': SAND: dark yellowish brown (10 YR 4/2); fine to medium-grained sand; subangular to rounded; moderately sorted; quartzite pebbles; subangular; caliche deposits; very calcareous; unconsolidated; dry.	
10				
			<u>2.0-4.0' SAMPLE.</u> Recovered 1.9/2.0' = 95%. 2.0-2.6': SAND: moderate yellowish brown (10 YR 5/4) to grayish orange (10 YR 7/4); very fine to fine-grained; rounded; well sorted; clayey; occasional subangular quartzite pebbles and cobbles; caliche deposits; very calcareous; consolidated; dry.	
15				
20				

LOG OF BOREHOLE

Location Rocky Flats Plant; Mound Area
Coordinates N 36413.74 E 23231.24
Total Depth 148.00'

Borehole/Well No. 18-87BR
Ground Surface Elevation 5967.38'
Water Level Encountered 16.8'
Static 5939.13' (12/01/87)

Drilling Company Boyles Bros
Date Drilled August 5-6; August 18-20, 1987
Drilling Method Hollow Stem Auger; Rotary Core
Logged By L.A. Gregory-Frost; K.D. Holliway
Geologist

Driller T. High; P. Bushkovski
Helper R. Sharp; K. Parker
Drilling Fluid None: 0.0 - 54.0'
Water: 54.0 - 148.0' JJP
Checked By Site Manager

CEARP Manager

Comments Surface casing set to 52.7' August 10, 1987 by L.A. Gregory-Frost

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
20			2.6-4.0': SANDY GRAVEL: moderate yellowish brown (10 YR 5/4) to grayish orange (10 YR 7/4); medium to coarse-grained sand; rounded to subangular; well sorted; quartzite pebbles and cobbles; subangular to angular; caliche deposits crystalline and chalky; very calcareous; unconsolidated; dry.	127.00-136.85': Packer Test Interval #3.
25			4.0-7.7' SAMPLE. Recovered 2.0/3.7'=54%. GRAVEL: moderate yellowish brown (10 YR 5/4) to grayish orange (10 YR 7/4); medium to very coarse-grained; sandy; poorly sorted; subangular; unconsolidated with occasional clayey consolidated zones; granite and quartzite pebbles and cobbles; subangular to angular; very calcareous; caliche deposits; dry.	133.20-142.85': Packer Test Interval #1.
30			7.7-10.2' SAMPLE. No recovery.	
			10.2-12.7' SAMPLE. No recovery.	
			12.7-15.2' SAMPLE. No recovery. Cuttings and rig response indicate drilling in gravel with cobbles.	
35				
40				

LOG OF BOREHOLE

Location Rocky Flats Plant; Mound Area
Coordinates N 36413.74 E 23231.24
Total Depth 148.00'

Borehole/Well No. 18-87BR
Ground Surface Elevation 5967.38'
Water Level Encountered 16.8'
Static 5939.13' (12/01/87)

Drilling Company Boyles Bros
Date Drilled August 5-6; August 18-20, 1987
Drilling Method Hollow Stem Auger; Rotary Core
Logged By L.A. Gregory-Frost; K.D. Holliway
Geologist

Driller T. High; P. Bushkovski
Helper R. Sharp; K. Parker
Drilling Fluid None: 0.0 - 54.0'
Water: 54.0 - 148.0'
Checked By Site Manager

CEARP Manager

Comments Surface casing set to 52.7' August 10, 1987 by L.A. Gregory-Frost

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
40			<u>15.2-17.7' SAMPLE.</u> Recovered 0.9/2.5' = 36%. 16.6-17.7': SAND: moderate yellowish brown (10 YR 5/4) to moderate brown (5 YR 4/4); medium to very coarse-grained; predominantly very coarse-grained; subangular; poorly sorted; abundant quartzite and granite pebbles and cobbles; subangular to rounded; slightly clayey; unconsolidated, loose grains; moist to saturated.	
45			<u>17.7-20.2' SAMPLE.</u> Recovered 0.6/2.5 = 24%. SANDY GRAVEL: moderate yellowish brown (10 YR 5/4); quartzite and granite pebbles and cobbles; subangular; very sandy; very coarse-grained; rounded to subangular; well sorted; unconsolidated; saturated.	
50			<u>20.2-22.7' SAMPLE.</u> Recovered 1.9/2.5' = 76%. GRAVEL: moderate yellowish brown (10 YR 5/4); quartzite and granite pebbles and cobbles; rounded to subangular; fine to very coarse-grained; sandy; angular to rounded; poorly sorted; slightly clayey; unconsolidated; saturated.	
55			<u>22.7-25.2' SAMPLE.</u> No recovery. <u>ARAPAHOE FORMATION</u> 24.6-25.2': CLAYSTONE: base 0.6' of sample tube coated with clay.	53.85-63.00': Packer Test Interval #12.
60				

LOG OF BOREHOLE

Location Rocky Flats Plant; Mound Area
Coordinates N 36413.74 E 23231.24
Total Depth 148.00'

Borehole/Well No. 18-87BR
Ground Surface Elevation 5967.38'
Water Level Encountered 16.8'
Static 5939.13' (12/01/87)

Drilling Company Boyles Bros
Date Drilled August 5-6; August 18-20, 1987
Drilling Method Hollow Stem Auger; Rotary Core
Logged By L.A. Gregory-Frost; K.D. Holliday
Geologist

Driller T. High; P. Bushkovski
Helper R. Sharp; K. Parker
Drilling Fluid None; 0.0 - 54.0'
Checked By Water: 54.0 - 148.0'
Site Manager

CEARP Manager

Comments Surface casing set to 52.7' August 10, 1987 by L.A. Gregory-Frost

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
60			<p><u>25.2-27.7' SAMPLE.</u> No recovery. CLAYSTONE: on outside of sample tube.</p> <p><u>27.7-30.2' SAMPLE.</u> No recovery.</p> <p><u>30.2-32.7' SAMPLE.</u> No recovery.</p>	
65			<p><u>32.7-35.2' SAMPLE.</u> Recovered 1.7/2.5' = 68%. CLAYSTONE: light olive gray (5 Y 5/2); silty; occasional fractures; occasional moderate yellowish brown (10 YR 5/4) mottling; carbonaceous debris; consolidated; weathered; dry to moist.</p>	63.00-72.65': Packer Test Interval #11.
70			<p><u>35.2-37.7' SAMPLE.</u> Recovered 2.2/2.5' = 88%. CLAYSTONE: same as above; dry to moist.</p>	
75			<p><u>37.7-40.2' SAMPLE.</u> Recovered 2.5/2.5' = 100%. CLAYSTONE: light olive gray (5 Y 5/2); silty; occasional fractures-dark yellowish orange (10 YR 6/6); occasional carbonaceous debris; rare carbonized plant leaf casts on bedding planes; consolidated; weathered; moist.</p>	73.47-83.12': Packer Test Interval #10.
80				

LOG OF BOREHOLE

Location Rocky Flats Plant; Mound Area
Coordinates N 36413.74 E 23231.24
Total Depth 148.00'

Borehole/Well No. 18-87BR
Ground Surface Elevation 5967.38'
Water Level Encountered 16.8'
Static 5939.13' (12/01/87)

Drilling Company Boyles Bros
Date Drilled August 5-6; August 18-20, 1987
Drilling Method Hollow Stem Auger; Rotary Core
Logged By L.A. Gregory-Frost; K.D. Holliway
Geologist

Driller T. High; P. Bushkovski
Helper R. Sharp; K. Parker
Drilling Fluid None: 0.0 - 54.0'
Water: 54.0 - 148.0'
Checked By [Signature]
Site Manager

CEARP Manager

Comments Surface casing set to 52.7' August 10, 1987 by L.A. Gregory-Frost

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
80			<p><u>40.2-42.7' SAMPLE.</u> Recovered 3.0/2.5 = 120%. 40.2-42.3': CLAYSTONE: light olive gray (5 Y 5/2) and moderate yellowish brown (10 YR 5/4); silty; trace very fine-grained sand at base; weathered; moist. 42.3-42.7': CLAYSTONE: dark gray (N 3/0) with moderate yellowish brown (10 YR 5/4) and dark yellowish orange (10 YR 6/6) along fractures; silty; trace very fine-grained sand; weathered; moist.</p>	83.15-92.86': Packer Test Interval #9.
85			<p><u>42.7-45.2' SAMPLE.</u> Recovery 2.5/2.5' = 100%. 42.7-44.7': CLAYSTONE: dark gray (N 3/0) with moderate yellowish brown (10 YR 5/4) mottling; abundant carbonaceous debris; abundant coalified plant debris; silty; consolidated; weathered; moist. 44.7-45.2': CLAYSTONE: moderate yellowish brown (10 YR 5/4) and grayish black N 2/0; hard; coal lenses; abundant coalified plant material; broken up; light olive gray (5 Y 6/1) rooted claystone at base; weathered; dry to moist.</p>	86.40-96.05': Packer Test Interval #8.
90				88.40-98.05': Packer Test Interval #7.
95			<p><u>45.2-47.7' SAMPLE.</u> Recovered 2.5/2.5' = 100%. CLAYSTONE: dark gray (N 3/0) with dark yellowish orange (10 YR 6/6) along fractures; silty; trace very fine to fine-grained sand; consolidated; weathered; moist.</p>	
100				98.05-107.70': Packer Test Interval #6.

LOG OF BOREHOLE

Location Rocky Flats Plant; Mound Area
Coordinates N 36413.74 E 23231.24
Total Depth 148.00'

Borehole/Well No. 18-87BR
Ground Surface Elevation 5967.38'
Water Level Encountered 16.8'
Static 5939.13' (12/01/87)

Drilling Company Boyles Bros
Date Drilled August 5-6; August 18-20, 1987
Drilling Method Hollow Stem Auger; Rotary Core
Logged By L.A. Gregory-Frost; K.D. Hollaway
Geologist

Driller T. High; P. Bushkovski
Helper R. Sharp; K. Parker
Drilling Fluid None: 0.0 - 54.0'
Water: 54.0 - 148.0' AP
Checked By _____
Site Manager

CEARP Manager

Comments Surface casing set to 52.7' August 10, 1987 by L.A. Gregory-Frost

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
100			<p><u>47.7-50.2' SAMPLE.</u> Recovered 2.5/2.5' = 100%. 47.7-48.5': CLAYSTONE: same as above (45.2-47.7'); moist. 48.5-50.2': CLAYSTONE: dark gray (N 3/0); silty; trace very fine-grained sand; calcareous deposits along fractures; consolidated; unweathered; moist.</p>	
105			<p><u>50.2-52.7' SAMPLE.</u> Recovered 2.5/2.5' = 100%. CLAYSTONE: same as above (48.5-50.2'); moist.</p>	
110			<p><u>54.0-56.0' SAMPLE.</u> Recovered 2.0/2.0' = 100%. RQD = 1.85/2.0' = 92.5%. CLAYSTONE: olive black (5 Y 2/1); some silt; some very fine-grained sand at 55.0'; dry.</p>	
115			<p><u>56.0-58.0' SAMPLE.</u> Recovered 0.6/2.0' = 30%. RQD = 0.0/0.6' = 0%. 56.0-57.3': CLAYSTONE: olive black (5 Y 2/1); some silt; some sand; trace plant fossils; dry.</p>	
120			<p><u>58.0-60.0' SAMPLE.</u> Recovered 2.7/2.0' = 135%. RQD = 1.19/2.7' = 44%. 57.3-58.0': CLAYSTONE: recovered core from previous run; same as 56.0-57.3'; dry. 58.0-60.0': CLAYSTONE: olive black (5 Y 2/1); some silt; trace sand; brittle; damp.</p>	<p>107.70-117.35': Packer Test Interval #5.</p> <p>117.35-127.00': Packer Test Interval #4.</p>

LOG OF BOREHOLE

Location Rocky Flats Plant; Mound Area
Coordinates N 36413.74 E 23231.24
Total Depth 148.00'

Borehole/Well No. 18-87BR
Ground Surface Elevation 5967.38'
Water Level Encountered 16.8'
Static 5939.13' (12/01/87)

Drilling Company Boyles Bros
Date Drilled August 5-6; August 18-20, 1987
Drilling Method Hollow Stem Auger; Rotary Core
Logged By L.A. Gregory-Frost; K.D. Holliway
Geologist

Driller T. High; P. Bushkovski
Helper R. Sharp; K. Parker
Drilling Fluid None: 0.0 - 54.0'
Water: 54.0 - 148.0' *JP*
Checked By _____
Site Manager

CEARP Manager

Comments Surface casing set to 52.7' August 10, 1987 by L.A. Gregory-Frost

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
120			<p><u>60.0-65.0' SAMPLE.</u> Recovered 4.25/5.0' = 85%. RQD = 2.25/4.25' = 53%. 60.0-61.45': CLAYSTONE: greenish black (5 GY 2/1) to olive black (5 Y 2/1); trace silt; brittle; damp. 61.45-64.25': CLAYSTONE: olive black (5 Y 2/1) to dark gray (N 3/0); trace sand; damp.</p> <p><u>65.0-69.0' SAMPLE.</u> Recovered 2.4/4.0' = 60%. RQD = 1.30/2.4' = 54%. CLAYSTONE: medium dark gray (N 4/0) to dark gray (N 3/0); some silt; trace sand; trace plant fossils; damp.</p> <p><u>69.0-73.0' SAMPLE.</u> Recovered 3.0/4.0' = 75%. RQD = 0.0/3.0' = 0%. 69.0-69.6': CLAYSTONE: same as above; damp. 69.6-73.0': CLAYEY SILTSTONE: dark greenish gray (5 GY 4/1) to dark gray (N 3/0); some silt; some clay; some sand, 2.0-3.0 phi; fairly well cemented; fairly well sorted; damp.</p>	<p>123.55-133.20': Packer Test Interval #2.</p>
125				
130				
135				
140				

LOG OF BOREHOLE

Location Rocky Flats Plant; Mound Area
Coordinates N 36413.74 E 23231.24
Total Depth 148.00'

Borehole/Well No. 18-87BR
Ground Surface Elevation 5967.38'
Water Level Encountered 16.8'
Static 5939.13' (12/01/87)

Drilling Company Boyles Bros
Date Drilled August 5-6; August 18-20, 1987
Drilling Method Hollow Stem Auger; Rotary Core
Logged By L.A. Gregory-Frost; K.D. Hollaway
Geologist

Driller T. High; P. Bushkovski
Helper R. Sharp; K. Parker
Drilling Fluid None: 0.0 - 54.0'
Water: 54.0 - 148.0'
Checked By [Signature]
Site Manager

CEARP Manager

Comments Surface casing set to 52.7" August 10, 1987 by L.A. Gregory-Frost

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
140			<p><u>73.0-77.0' SAMPLE.</u> Recovered 2.2/4.0' = 55%. RQD = 0.90/2.2' = 68.2%.</p> <p>73.0-74.35': CLAYEY SANDSTONE: medium gray (N 5/0) to medium dark gray (N 4/0); some clay; sand 2.0-3.0 phi well sorted; poorly cemented; damp.</p> <p>74.35-75.20': SANDY SILTY CLAYSTONE: medium gray (N 5/0) to medium dark gray (N 4/0); some very fine-grained sand; some silt; some plant fossils; damp.</p> <p><u>77.0-79.0' SAMPLE.</u> Recovered 2.6/2.0' = 130%. RQD = 1.13/2.6' = 43.1%.</p> <p>75.20-76.0': CLAYSTONE: silty core recovered from previous run; same as 74.35-75.20'.</p> <p>77.0-77.9': SILTY CLAYSTONE: dark gray (N 3/0) to olive black (5 Y 2/1); some silt; damp.</p> <p>77.9-79.0': CLAYEY SILTY SAND: dark gray (N 3/0) to olive black (5 Y 2/1); very fine-grained, 8.5-4.0 phi; trace plant fossils; slightly damp.</p> <p><u>79.0-81.0' SAMPLE.</u> Recovered 2.0/2.0' = 100%. RQD = 1.6/2.0' = 80%.</p> <p>SILTY CLAYSTONE: olive black (5 Y 2/1); some silt; trace very fine-grained sand; some plant fossils; slightly damp.</p>	
145				
150				

LOG OF BOREHOLE

Location Rocky Flats Plant; Mound Area
Coordinates N 36413.74 E 23231.24
Total Depth 148.00'

Borehole/Well No. 18-87BR
Ground Surface Elevation 5967.38'
Water Level Encountered 16.8'
Static 5939.13' (12/01/87)

Drilling Company Boyles Bros
Date Drilled August 5-6; August 18-20, 1987
Drilling Method Hollow Stem Auger; Rotary Core
Logged By L.A. Gregory-Frost; K.D. Holliway
Geologist

Driller T. High; P. Bushkovski
Helper R. Sharp; K. Parker
Drilling Fluid None: 0.0 - 54.0'
Water: 54.0 - 148.0'
Checked By Site Manager

CEARP Manager

Comments Surface casing set to 52.7' August 10, 1987 by L.A. Gregory-Frost

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			<u>81.0-85.0' SAMPLE.</u> Recovered 4.0/4.0' = 100%. RQD = 2.85/4.0' = 71.3%. 81.0-84.4': SILTY CLAYSTONE: dark greenish gray (5 GY 4/1) to olive black (5 Y 2/1); some silt; trace fine-grained sand; some plant fossils; damp. 84.4-85.0': CLAYSTONE: medium dark gray (N 4/0); moist.	
			<u>85.0-88.0' SAMPLE.</u> Recovered 0.8/3.0' = 27%. RQD = 0.47/0.80' = 50%. SILTY CLAYSTONE: dark gray (N 4/0); some silt; damp to moist.	
			<u>88.0-90.0' SAMPLE.</u> Recovered 0.8/2.0' = 40%. RQD = 0.0/0.8' = 0%. CLAYSTONE: olive black (5 Y 2/1); trace silt; moist.	
			<u>90.0-92.0' SAMPLE.</u> Recovered 1.9/2.0' = 95%. RQD = 1.81/1.9' = 95%. SILTY CLAYSTONE: olive black (5 Y 2/1) to dark gray (N 3/0); some silt; some very fine-grained sand; occasional plant fossils; dry.	
			<u>92.0-94.0' SAMPLE.</u> Recovered 2.2/2.0' = 110%. RQD = 1.8/2.2' = 81.8%. SILTY CLAYSTONE: same as above; dry.	

LOG OF BOREHOLE

Location Rocky Flats Plant; Mound Area
Coordinates N 36413.74 E 23231.24
Total Depth 148.00'

Borehole/Well No. 18-87BR
Ground Surface Elevation 5967.38'
Water Level Encountered 16.8'
Static 5939.13' (12/01/87)

Drilling Company Boyles Bros
Date Drilled August 5-6; August 18-20, 1987
Drilling Method Hollow Stem Auger; Rotary Core
Logged By L.A. Gregory-Frost; K.D. Holliday
Geologist

Driller T. High; P. Bushkovski
Helper R. Sharp; K. Parker
Drilling Fluid None; 0.0 - 54.0'
Water: 54.0 - 148.0'
Checked By Site Manager

CEARP Manager

Comments Surface casing set to 52.7' August 10, 1987 by L.A. Gregory-Frost

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			<u>94.0-97.0' SAMPLE.</u> Recovered 1.3/3.0' = 43.3%. RQD = 0.0/1.3' = 0.0%. SILTY CLAYSTONE: same as above; dry.	
			<u>97.0-99.0' SAMPLE.</u> Recovered 3.0/2.0' = 150%. RQD = 0.0/3.0' = 0.0%. SILTY CLAYSTONE: same as above; dry.	
			<u>99.0-101.0' SAMPLE.</u> Recovered 2.0/2.0' = 100%. RQD = 1.0/2.0' = 50%. SILTY CLAYSTONE: olive black (5 Y 2/1) to dark gray (N 3/0); some silt; some very fine-grained sand; occasional plant fossils; small stringers of coal from 100.00-100.25'; dry.	
			<u>101.0-104.0' SAMPLE.</u> Recovered 1.3/3.0' = 43%. RQD = 0.0/1.3' = 0.0%. SILTY CLAYSTONE: same as above; except no coal; dry.	
			<u>104.0-107.0' SAMPLE.</u> Recovered 3.75/3.0' = 125%. RQD = 3.27/3.75' = 87.2%. SILTY CLAYSTONE: same as above; recovered 0.75' silty claystone (same description) core from previous run; dry.	

LOG OF BOREHOLE

Location Rocky Flats Plant; Mound Area
 Coordinates N 36413.74 E 23231.24
 Total Depth 148.00'

Borehole/Well No. 18-87BR
 Ground Surface Elevation 5967.38'
 Water Level Encountered 16.8'
 Static 5939.13' (12/01/87)

Drilling Company Boyles Bros
 Date Drilled August 5-6; August 18-20, 1987
 Drilling Method Hollow Stem Auger; Rotary Core
 Logged By L.A. Gregory-Frost; K.D. Holliway
 Geologist

Driller T. High; P. Bushkovski
 Helper R. Sharp; K. Parker
 Drilling Fluid None: 0.0 - 54.0'
 Checked By Water: 54.0 - 148.0'
 Site Manager

CEARP Manager

Comments Surface casing set to 52.7' August 10, 1987 by L.A. Gregory-Frost

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			<u>107.0-110.0' SAMPLE.</u> Recovered 2.8/3.0' = 93.3%. RQD = 0.45/2.8' = 16%. 107.0-109.15': SILTY CLAYSTONE: same as above; dry. 109.15-109.80': CLAYEY SANDSTONE: very light gray (N 8/0) to dark gray (N 3/0); sand 3.0-4.0 phi, subrounded; well cemented; calcareous; dry.	
			<u>110.0-111.0' SAMPLE.</u> Recovered 1.0/1.0' = 100%. RQD = 0.0/1.0' = 0.0%. SANDSTONE: very light gray (N 8/0) to medium dark gray (N 4/0); very fine- grained; well cemented, calcareous cemen- tation; some plant fossils; some cross bed- ding; dry.	
			<u>111.0-115.0' SAMPLE.</u> Recovered 2.4/4.0' = 60%. RQD = 0.0/2.4' = 0.0%. 111.0-112.0': CLAYSTONE AND SAND- STONE: same as above; except have a quartzite rock at 111.20; dry. 112.0-113.15': SANDSTONE: medium gray (N 5/0) to medium dark gray (N 4/0); sand 3.5-2.5 phi, fairly well sorted; sub- angular to subrounded; some clay; some lamination; damp. 113.15-113.40': SILTY CLAYSTONE: dark gray (N 3/0); some silt; fairly well ce- mented; dry.	

LOG OF BOREHOLE

Location Rocky Flats Plant; Mound Area
 Coordinates N 36413.74 E 23231.24
 Total Depth 148.00'

Borehole/Well No. 18-87BR
 Ground Surface Elevation 5967.38'
 Water Level Encountered 16.8'
 Static 5939.13' (12/01/87)

Drilling Company Boyles Bros
 Date Drilled August 5-6; August 18-20, 1987
 Drilling Method Hollow Stem Auger; Rotary Core
 Logged By L.A. Gregory-Frost; K.D. Hollaway
 Geologist

Driller T. High; P. Bushkovski
 Helper R. Sharp; K. Parker
 Drilling Fluid None: 0.0 - 54.0'
 Water: 54.0 - 148.0'
 Checked By Site Manager

CEARP Manager

Comments Surface casing set to 52.7' August 10, 1987 by L.A. Gregory-Frost

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			<u>115.0-117.0' SAMPLE.</u> Recovered 0.9/2.0' = 45%. RQD = 0.0/2.0' = 0.0%. CLAYEY SANDSTONE: same as above; except sand 3.0-3.5 phi; small clay lenses; damp.	
			<u>117.0-119.0' SAMPLE.</u> Recovered 1.3/2.0' = 65%. RQD = 0.40/1.3' = 30.8%. 117.0-118.15': SILTY CLAYSTONE: dark gray (N 3/0); fairly well cemented; dry. 118.15-118.30': SANDSTONE: medium gray (N 5/0) to medium dark gray (N 4/0); sand 3.0-4.0 phi, fairly well sorted; some cementation; damp.	
			<u>119.0-121.5' SAMPLE.</u> Recovered 4.25/2.5' = 170%. RQD = 3.55/4.25' = 83.5%. SILTY CLAYSTONE: olive black (5 Y 2/1) to dark gray (N 3/0); recovered 1.90' of silty claystone and sandstone core from previous run; some sand in lenses; slightly damp to dry.	
			<u>121.5-124.0' SAMPLE.</u> Recovered 2.8/2.5' = 112%. RQD = 2.64/2.8' = 94.3%. SILTY CLAYSTONE: same as above; in- terbedded sandstone; 3.0-4.0 phi; fairly well cemented; occasional plant fossils; slightly damp to dry.	

LOG OF BOREHOLE

Location Rocky Flats Plant; Mound Area
Coordinates N 36413.74 E 23231.24
Total Depth 148.00'

Borehole/Well No. 18-87BR
Ground Surface Elevation 5967.38'
Water Level Encountered 16.8'
Static 5939.13' (12/01/87)

Drilling Company Boyles Bros
Date Drilled August 5-6; August 18-20, 1987
Drilling Method Hollow Stem Auger; Rotary Core
Logged By L.A. Gregory-Frost; K.D. Holliday
Geologist

Driller T. High; P. Bushkovski
Helper R. Sharp; K. Parker
Drilling Fluid None: 0.0 - 54.0'
Water: 54.0 - 148.0'
Checked By Site Manager

CEARP Manager

Comments Surface casing set to 52.7' August 10, 1987 by L.A. Gregory-Frost

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			<u>124.0-127.0' SAMPLE.</u> Recovered 3.0/3.0' = 100%. RQD = 2.78/3.0' = 93%. SILTY CLAYSTONE: same as above; damp to dry.	
			<u>127.0-131.0' SAMPLE.</u> Recovered 4.0/4.0' = 100%. RQD = 3.40/4.0' = 85%. CLAYEY SANDSTONE: light gray (N 7/0) to olive black (5 Y 2/1); sand 2.0-3.0 phi, fairly well sorted, some cementation; some clay in matrix and lenses; trace silt; occasional plant fossils; slightly damp to dry.	
			<u>131.0-135.0' SAMPLE.</u> Recovered 4.0/4.0' = 100%. RQD = 4.00/4.00' = 100%. 131.0-133.20': CLAYEY SANDSTONE: same as above; slightly damp to dry. 133.20-135.0': SILTY CLAYSTONE: olive black (5 Y 2/1) some silt; trace fine- grained sand; occasional plant fossils.	
			<u>135.0-139.0' SAMPLE.</u> Recovered 3.95/4.0' = 99%. RQD = 3.7/3.95' = 93.7%. SILTY CLAYSTONE: same as above.	
			<u>139.0-143.0' SAMPLE.</u> Recovered 3.7/4.0' = 93%. RQD = 3.36/3.7' = 91%. 139.0-140.1': SILTY CLAYSTONE: same as above. 140.1-143.7': CLAYSTONE: olive black (5 Y 2/1); trace silt; trace plant fossils; dry.	

LOG OF BOREHOLE

Location Rocky Flats Plant; Mound Area
Coordinates N 36413.74 E 23231.24
Total Depth 148.00'

Borehole/Well No. 18-87BR
Ground Surface Elevation 5967.38'
Water Level Encountered 16.8'
Static 5939.13' (12/01/87)

Drilling Company Boyles Bros
Date Drilled August 5-6; August 18-20, 1987
Drilling Method Hollow Stem Auger; Rotary Core
Logged By L.A. Gregory-Frost; K.D. Holliway
Geologist

Driller T. High ; P. Bushkovski
Helper R. Sharp ; K. Parker
Drilling Fluid None: 0.0 - 54.0'
Water: 54.0 - 148.0'
Checked By JJP
Site Manager

CEARP Manager

Comments Surface casing set to 52.7' August 10, 1987 by L.A. Gregory-Frost

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			<u>143.0-147.0' SAMPLE.</u> Recovered 0.2/4.0' = 50%. RQD = 0.0/4.0' = 0%. CLAYSTONE: same as above.	
			<u>147.0-148.0' SAMPLE.</u> Recovered 2.7/4.0' = 67.5%. RQD = 0.8/2.70' = 29.6%. CLAYSTONE: same as above; recovered 1.70' of claystone core (same description) from previous run; damp.	
			TOTAL DEPTH: 148.00'	

WELL COMPLETION INFORMATION

Location Rocky Flats Plant; Mound Area
Coordinates N 36413.74 E 23231.24
Total Depth: Well 133.70'
Borehole 148.00'

Well No. 18-87BR

Elevation: Ground Surface 5967.38'
Top of Casing 5969.45'

Formation of Completion Arapahoe Formation

Casing Material Sch 5, type 316 TFJ stainless steel

Casing Diameter 2" ID

Screen Material 0.010" wire wrap, type 316 TFJ stainless steel

Surface Casing Diameter 5" ID

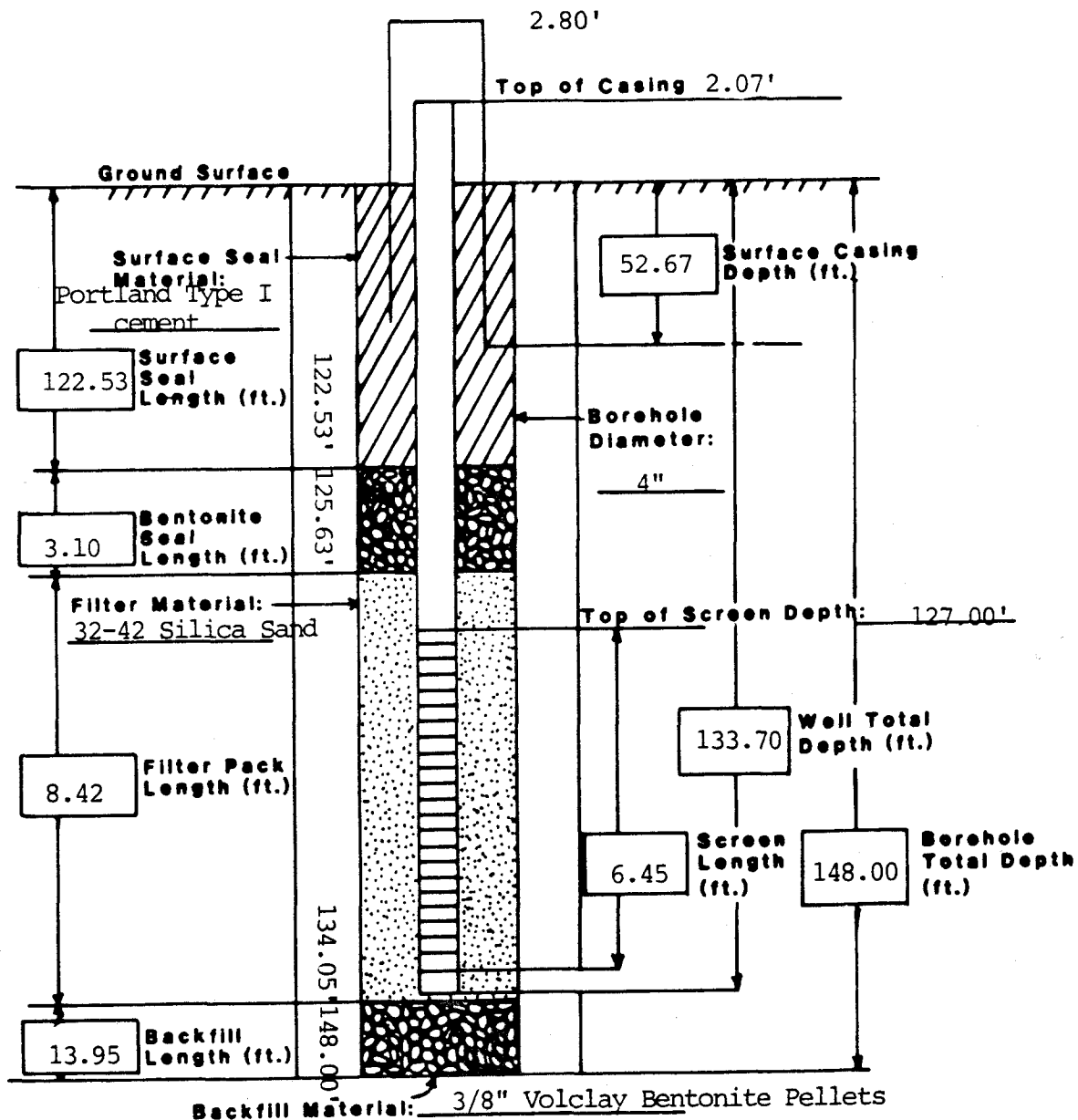
Date Installed Aug. 25, 1987

Approved By L.A. Gregory

Installed By J.B. Bergman
Geologist

Brent Lewis
Site Manager
CEARP Manager

Comments Surface casing set to 52.67' by L.A. Gregory-Frost on August 13, 1987



Packer test data for well 18-87BR are presented on the following table. However, the well was still in development on December 1, 1987, and static water levels could not be measured. Hydraulic conductivity values were thus not calculated.

PACKER TEST DATA SHEET

Job No.: 2029-17-02
 Location: Rocky Flats Plant: Mound Area
 Well No.: 18-87BR
 Borehole Diameter: 0.333'
 Acrylic Tube Diameter: 0.1663'

Static Water Level: _____
 Date of Water Level: _____
 Page 1 of 2

Comments: _____

Test Interval No.	Top of Test Interval	Bottom of Test Interval	Test Length (minutes)	Gage Pressure	Gage Height	Avg. H ₂ O Height	Gage Height + Avg. H ₂ O Height	Δh	Date of Test	Lithology	Geologist
1	135.20	142.85	15	0	5.50'	4.13	9.63'	0.73	8/21/87	KCL	KDH
			15	32.4	5.50'	N/A	N/A	0.135	8/21/87	KCL	KDH
			15	0	5.50'	-	-	-0.07	8/21/87	KCL	KDH
2	123.55	133.20	15	0	5.50	-	-	-0.02	8/21/87	Kass	KDH
			15	30.0	5.50	N/A	N/A	0.08	8/21/87	Kass	KDH
			15	0	5.50	-	-	-0.065	8/21/87	Kass	KDH
3	127.00	136.65	15	0	5.50	-	-	-0.07	8/21/87	Kass	KDH
			15	30.90	5.50	N/A	N/A	0.38	8/21/87	Kass	KDH
			15	0	5.50	-	-	-0.051	8/21/87	Kass	KDH
4	117.35	127.00	15	0	5.50	-	-	-0.07	8/21/87	KCL	KDH
			15	28.48	5.50	N/A	N/A	0.11	8/21/87	KCL	KDH
			15	0	5.50	-	-	-0.04	8/21/87	KCL	KDH
5	107.70	117.35	15	0	5.50	4.72	10.22	0.56	8/21/87	KCL	KDH
			15	26.64	5.50	N/A	N/A	1.22	8/21/87	KCL	KDH
			15	0	5.50	4.64	10.14	0.52	8/21/87	KCL	KDH
6	98.05	107.70	15	0	5.50	4.66	10.16	0.47	8/21/87	KCL	KDH
			15	24.05	5.50	N/A	N/A	5.30	8/21/87	KCL	KDH
			15	0	5.50	4.38	9.88	0.210	8/21/87	KCL	KDH

PACKER TEST DATA SHEET

Job No.: 2029-17-02 Static Water Level: _____
 Location: Rocky Flats Plant; Mound Area Date of Water Level: _____
 Well No.: 18-87BR (CON'T) Page 2 of 2
 Borehole Diameter: 0.333' Comments: _____
 Acrylic Tube Diameter: 0.1663'

Test Interval No.	Top of Test Interval	Bottom of Test Interval	Test Length (minutes)	Gage Pressure	Gage Height	Avg. H ₂ O Height	Gage Height + Avg. H ₂ O Height	Δh	Date of Test	Lithology	Geologist
7	88.40	98.05	15	0	5.50	4.51	10.01	0.0	8/24/87	KCL	JBB
			15	17.92	5.50			-	8/24/87	KCL	JBB
			15	-	5.50			-	8/24/87	KCL	JBB
8	86.40	96.05	15	0	5.50	5.53	11.03	0.505	8/24/87	KCL	JBB
			15	18.08	5.50	N/A	N/A	-	8/24/87	KCL	JBB
			15	-	5.50	-	-	-	8/24/87	KCL	JBB
9	83.15	92.80	15	0	5.50	3.85	9.35	0.24	8/24/87	KCL	JBB
			15	18	5.50	N/A	N/A	2.693	8/24/87	KCL	JBB
			15	0	5.50	-	-	-0.192	8/24/87	KCL	JBB
10	73.47	83.12	15	0	5.50	3.68	9.18	1.238	8/24/87	KCL	LGF
			15	15	5.50	N/A	N/A	0.085	8/24/87	KCL	LGF
			15	0	5.50	4.50	10.00	0.010	8/24/87	KCL	LGF
11	63.0	72.65	15	0	5.50	-	-	-1.50	8/24/87	KCL	JBB
			15	12.5	5.50	N/A	N/A	0.045	8/24/87	KCL	JBB
			15	0	5.50	-	-	-	8/24/87	KCL	JBB
12	53.35	63.0	15	0	5.50	3.50	9.00	.340	8/24/87	KCL	JBB
			15	10.25	5.50	N/A	N/A	2.060	8/24/87	KCL	JBB
			15	0	5.50	-	-	-	8/24/87	KCL	JBB

12/11/87

Water Level Data
for
Rockwell (Rocky Flats)

<u>Date Measured</u>	<u>Depth to Water from TOC</u>	<u>Elevation TOC (ft)</u>	<u>Water Level Elev. (ft)</u>
--------------------------	------------------------------------	-------------------------------	-----------------------------------

** Well Number: 1887BR

12/01/87	30.32	5969.45	5939.13
----------	-------	---------	---------

INDEX OF DATA

Boring No.: 19-87

Completed as well? Yes

Data in File

- ☒ Log of Borehole
- ☒ Well Construction Summaries
- ☐ Well Development Summaries
- ☐ Hydraulic Conductivity Test Data
and Results
- ☐ Packer Test Data and Results
- ☒ Water Level Data

LOG OF BOREHOLE

Location Rocky Flats Plant; Mound Area
Coordinates N 36633.42 E 23064.85
Total Depth 16.10'

Borehole/Well No. 19-87
Ground Surface Elevation 5967.98'
Water Level Encountered None
Static 5958.07' (12/01/87)

Drilling Company Boyles Bros
Date Drilled August 5, 1987
Drilling Method Hollow Stem Auger
Logged By J.B. Bergman
Geologist

Driller T. Merritt
Helper J. Duncan
Drilling Fluid None
Checked By [Signature]
Site Manager
Brent Lewis
SEARP Manager

Comments _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
0			ROCKY FLATS ALLUVIUM	
			<u>0.0-2.0' SAMPLE.</u> Recovered 1.4/2.0' = 70%. CLAY AND GRAVEL: grayish brown (5 YR 3/2); abundant gray quartzite cobbles, pebbles and gravels; some roots and grasses; poorly sorted; unconsolidated; some caliche-reacts strongly with HCl; slightly damp.	HNu Background=0.4 OVA Background=0.0 No Ludlum readings taken.
5			<u>2.0-4.0' SAMPLE.</u> Recovered 1.9/2.0' = 95%. CLAY AND GRAVEL: pale yellowish brown (10 YR 6/2); clay, abundant caliche-strongly reacts with HCl; abundant quartzite pebbles and cobbles; angular; poorly sorted; unconsolidated; dry to slightly damp.	<u>2.0-4.0':</u> Readings on core: HNu = 0.2-2.0; OVA = 0.0 <u>4.0-5.3':</u> Readings on core: HNu = 1-100; OVA = 0.0
10			<u>4.0-5.3' SAMPLE.</u> Recovered 1.9/1.3' = 146%. CLAY AND GRAVEL: same as above with some moderate brown (5 YR 3/4) clay patches; dry.	<u>8.1-11.1':</u> Readings on core: HNu=0.4-1.2; OVA=0.0-2.0
15			<u>5.3-6.0' SAMPLE.</u> Recovered 0.7/0.7 = 100%. CLAY AND GRAVEL: same as above; dry.	<u>14.1-16.1':</u> Readings on core: HNu=2; OVA=1.2
20			<u>6.0-8.1' SAMPLE.</u> No recovery. Drilled with center bit.	

LOG
OF
BOREHOLE

Location Rocky Flats Plant; Mound Area
Coordinates N 36633.42 E 23064.85
Total Depth 16.10'

Borehole/Well No. 19-87
Ground Surface Elevation 5967.98'
Water Level Encountered None
Static 5958.07' (12/01/87)

Drilling Company Boyles Bros
Date Drilled August 5, 1987
Drilling Method Hollow Stem Auger
Logged By J.R. Bergman
Geologist

Driller T. Merritt
Helper J. Duncan
Drilling Fluid None
Checked By J. Pasella
Site Manager

CEARP Manager

Comments _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			<u>8.1-11.1' SAMPLE.</u> Recovered 3.0/3.0' = 100%. SANDY CLAY AND GRAVEL: moderate brown (5 YR 3/4) and light brown (5 YR 5/6); sandy clay matrix with abundant quartzite gravels; poorly sorted; very fine-grained; unconsolidated; dry.	
			<u>11.1-14.1' SAMPLE.</u> Recovered 3.0/3.0' = 100%. 11.1-11.4': CLAY: olive gray (5 Y 3/2); abundant caliche-reacts strongly with HCl; trace moderate yellowish brown (10 YR 5/4) clay patches; trace angular pebbles and gravels; dry.	
			<u>ARAPAHOE FORMATION</u>	
			11.4-14.1': CLAYSTONE: olive gray (5 Y 3/2); some moderate brown (10 YR 5/4) mottles; abundant CaCO ₃ concretions; white-reacts strongly with HCl; some black organics; dry.	
			<u>14.1-16.1' SAMPLE.</u> Recovered 2.0/2.0' = 100%. CLAYSTONE: same as above; dry.	
			TOTAL DEPTH: 16.10'	

WELL COMPLETION INFORMATION

Location Rocky Flats Plant; Mound Area

Coordinates N 36633.42 E 23064.85

Total Depth: Well 11.89'

Borehole 16.05'

Formation of Completion Rocky Flats Alluvium

Casing Material Sch 5, type 316 TFJ stainless steel

Screen Material 0.010" wire wrap, type 316 TFJ stainless steel

Date Installed Aug. 6, 1987

Installed By J.B. Bergman
Geologist

Well No. 19-87

Elevation: Ground Surface 5967.98'

Top of Casing 5969.84'

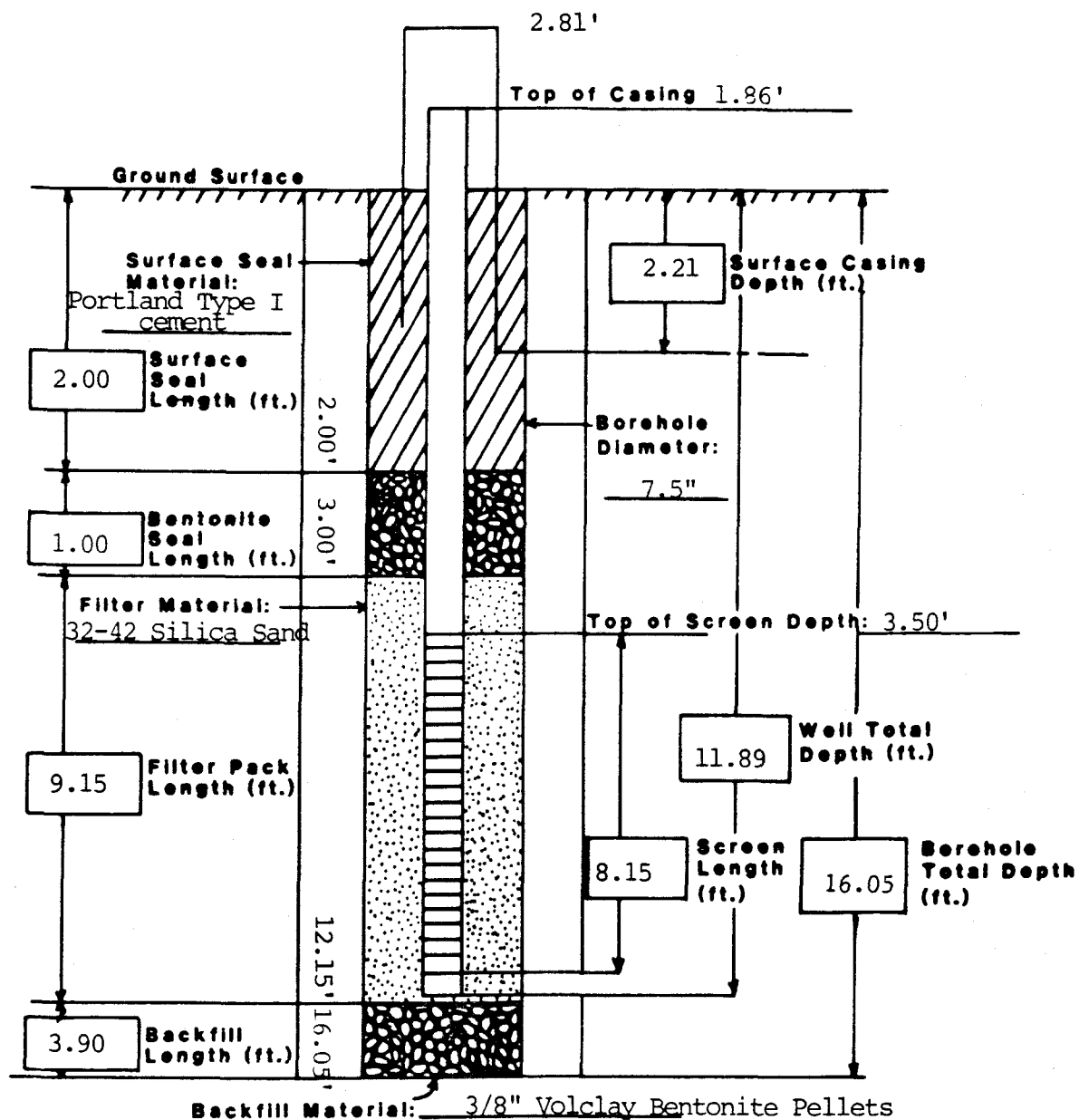
Casing Diameter 2" ID

Surface Casing Diameter 5" ID

Approved By

J. Pasche
Site Manager
Brent Lewis
CEARP Manager

Comments



12/11/87

Water Level Data
for
Rockwell (Rocky Flats)

Date
Measured

Depth to Water
from TOC

Elevation
TOC (ft)

Water Level
Elev. (ft)

** Well Number: 1987

12/01/87

11.77

5969.84

5958.07

INDEX OF DATA

Boring No.: 20-87BR

Completed as well? Yes

Data in File

- ☒ Log of Borehole
- ☒ Well Construction Summaries
- ☐ Well Development Summaries
- ☐ Hydraulic Conductivity Test Data
and Results
- ☒ Packer Test Data and Results
- ☒ Water Level Data

LOG OF BOREHOLE

Location Rocky Flats Plant: Mound Area
Coordinates N 36644.48 E 23048.42
Total Depth 127.00'

Borehole/Well No. 20-87BR
Ground Surface Elevation 5968.10'
Water Level Encountered None
Static 5861.19' (12/01/87)

Drilling Company Boyles Bros
Date Drilled July 30-31 and Aug. 3, 1987
Drilling Method Hollow Stem Auger; Rotary Core
Logged By J.B. Bergman; K.D. Holliway
Geologist

Driller T. Merritt; P. Bushkovski
Helper T. High; J. Duncan; K. Parker
Drilling Fluid 0 - 51.70': None
51.70' - 127.0': Water
Checked By [Signature]

Site Manager
CEARP Manager

Comments Surface casing set to 51.64' by J.B. Bergman on August 4, 1987.

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
0			<u>ROCKY FLATS ALLUVIUM</u>	
			<u>0.0-2.0' SAMPLE.</u> Recovered 1.85/2.0' = 93%. GRAVEL: gray and pink quartzite in a moderate brown (5 YR 3/4) sand matrix; abundant roots and grasses in top 2"; unconsolidated; unsorted; dry.	HNu Background = 0.2-0.4; OVA Background = 0.0; Ludlum Background = 0.0
5			<u>2.0-4.0' SAMPLE.</u> Recovered 2.0/2.0' = 100%. SAND AND GRAVEL: grayish orange (10 YR 7/4); ~30% clay; light brown (5 YR 5/6); abundant caliche; dry.	
10			<u>4.0-6.4' SAMPLE.</u> Recovered 2.4/2.4' = 100%. GRAVEL: moderate yellowish brown (10 YR 5/4) matrix of clay; abundant caliche; unsorted; unconsolidated; angular; moist.	
			<u>6.4-8.8' SAMPLE. LOST CORE.</u> Drilled with center bit to get through boulders.	
15			<u>8.8-10.8' SAMPLE.</u> Recovered 1.3/2.0' = 65%. SAND AND GRAVEL: moderate yellowish brown (10 YR 5/4) sand matrix with abundant quartzite pebbles and gravels; unconsolidated; unsorted; angular to sub-rounded; very fine-grained sand; moist.	
20			<u>10.8-13.8' SAMPLE.</u> Recovered 3.5/3.0' = 117%. 10.8-11.8': SAND AND GRAVEL: same as above; moist.	<u>18.8'</u> : Readings on core: HNu = 15.0 OVA = 12.0

LOG OF BOREHOLE

Location Rocky Flats Plant; Mound Area
Coordinates N 36644.48 E 23048.42
Total Depth 127.00'

Borehole/Well No. 20-87BR
Ground Surface Elevation 5968.10'
Water Level Encountered None
Static 5861.19' (12/01/87)

Drilling Company Boyles Bros
Date Drilled July 30-31 and Aug. 3, 1987
Drilling Method Hollow Stem Auger; Rotary Core
Logged By J.B. Bergman; K.D. Holliway
Geologist

Driller T. Merritt; P. Bushkovski
Helper T. High; J. Duncan; K. Parker
Drilling Fluid 0 - 51.70': None
51.70' - 127.0': Water
Checked By JJP
Site Manager

Comments Surface casing set to 51.64' by J.B. Bergman on August 4, 1987.
CEARP Manager

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
20			<u>ARAPAHOE FORMATION</u>	
			11.8-13.8': CLAYSTONE: medium gray (N 5/0) with abundant moderate yellowish brown (10 YR 5/4) mottles; abundant black organic fragments; abundant caliche-reacts strongly with HCl; trace white very fine-grained sand; well sorted; moist.	20.8-23.8': Readings on core: HNu = 2.0 OVA = 0.0
25			<u>13.8-15.8' SAMPLE.</u> Recovered 2.0/2.0' = 100%. SANDY CLAYSTONE: moderate yellowish brown (10 YR 5/4); very fine-grained, light gray (N 6/0) sand and moderate yellowish brown (10 YR 5/4) sand; some caliche; some black organic fragments; well sorted; rounded; moist.	23.8-25.8': Readings on core: HNu = 15.0 OVA = 3.0
30			<u>15.8-18.8' SAMPLE.</u> Recovered 3.2/3.0' = 107%. CLAYSTONE: same as above; slightly moist.	
			<u>18.8-20.8' SAMPLE.</u> Recovered 2.0/2.0' = 100%. CLAYSTONE: same as above; moist.	34.70': Reading in well head: HNU = 20-30; OVA = 9.0
35			<u>20.8-23.8' SAMPLE.</u> Recovered 3.0/3.0' = 100%. CLAYSTONE: olive gray (5 Y 3/2) with abundant moderate yellowish brown (10 YR 5/4) mottles; some organics; some caliche; trace light gray (N 6/0) sand; very fine-grained; rounded; moist.	34.7-36.7': Readings on core: HNu = 2.0 OVA = 1.8
40				

LOG OF BOREHOLE

Location Rocky Flats Plant: Mound Area
Coordinates N 36644.48 E 23048.42
Total Depth 127.00'

Borehole/Well No. 20-87BR
Ground Surface Elevation 5968.10'
Water Level Encountered None
Static 5861.19' (12/01/87)

Drilling Company Boyles Bros
Date Drilled July 30-31 and Aug. 3, 1987
Drilling Method Hollow Stem Auger; Rotary Core
Logged By J.B. Bergman; K.D. Holliway
Geologist

Driller T. Merritt; P. Bushkovski
Helper T. High; J. Duncan; K. Parker
Drilling Fluid 0 - 51.70': None
51.70' - 127.0': Water
Checked By JBP
Site Manager

CEARP Manager

Comments Surface casing set to 51.64' by J.B. Bergman on August 4, 1987.

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
40			<u>23.8-25.8' SAMPLE.</u> Recovered 2.0/2.0' = 100%. SANDY CLAYSTONE: same as above with slight increase in sand content; moist.	
			<u>25.8-28.8' SAMPLE.</u> Recovered 3.0/3.0' = 100%. SANDY CLAYSTONE: same as above; moist.	
45			<u>28.8-30.8' SAMPLE.</u> Recovered 2.0/2.0' = 100%. CLAYSTONE: olive gray (5 Y 3/2) with abundant moderate yellowish brown (10 YR 5/4) mottles; abundant light brown (5 YR 5/6) FeO nodules; trace light gray (N 6/0) sandstone, very fine-grained; rounded; moist.	
50			<u>30.8-33.8' SAMPLE.</u> Recovered 3.0/3.0' = 100%. CLAYSTONE: same as above; moist.	No HNu, OVA, or Ludlum readings taken below 50.0'.
			<u>33.8-34.7' SAMPLE.</u> No sample. Adjust depth after taking a TD of borehole.	<u>53.90-63.55':</u> Packer Test Interval #10.
55			<u>34.7-36.7' SAMPLE.</u> Recovered 2.0/2.0' = 100%. CLAYSTONE: olive gray (5 Y 3/2) with abundant light brown (5 YR 5/6) stains; wet at top 4"-probably slough; homoge- neous; dense; weathered; trace very fine- grained sand; dry.	<u>55.90-65.55':</u> Packer Test Interval #9. <u>65.55-75.20':</u> Packer Test Interval #8.
60				

LOG OF BOREHOLE

Location Rocky Flats Plant; Mound Area
Coordinates N 36644.48 E 23048.42
Total Depth 127.00'

Borehole/Well No. 20-87BR
Ground Surface Elevation 5968.10'
Water Level Encountered None
Static 5861.19' (12/01/87)

Drilling Company Boyles Bros
Date Drilled July 30-31 and Aug. 3, 1987
Drilling Method Hollow Stem Auger; Rotary Core
Logged By J.B. Bergman; K.D. Holliway
Geologist

Driller T. Merritt; P. Bushkovski
Helper T. High; J. Duncan; K. Parker
Drilling Fluid 0 - 51.70': None
Checked By 51.70' - 127.0': Water *JLP*
Site Manager

CEARP Manager

Comments Surface casing set to 51.64' by J.B. Bergman on August 4, 1987.

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
60			<p><u>36.7-39.7' SAMPLE.</u> Recovered 3.5/2.0' = 88%. CLAYSTONE: olive gray (5 Y 3/2); some moderate yellowish brown (10 YR 5/4) stains; slightly weathered; homogenous; dense; abundant FeO nodules; some organic fragments; slightly moist.</p>	
65			<p><u>39.7-41.7' SAMPLE.</u> Recovered 2.1/2.0' = 105%. CLAYSTONE: same as above; slightly moist.</p>	
			<p><u>41.7-44.7' SAMPLE.</u> Recovered 1.7/3.0' = 85%. CLAYSTONE: same as above; dry.</p>	
70			<p><u>44.7-46.7' SAMPLE.</u> Recovered 2.0/2.0' = 100%. CLAYSTONE: olive gray (5 Y 3/2); some dark yellowish orange (10 YR 6/6) stains; friable; homogenous; some vertical fractures; dry.</p>	
			<p><u>46.7-49.7' SAMPLE.</u> Recovered 3.7/3.0' = 123%. CLAYSTONE: same as above; unweathered/weathered contact at 46.7'; dry.</p>	
75			<p><u>49.7-51.7' SAMPLE.</u> Recovered 3.5/2.0' = 175%. CLAYSTONE: same as above; unweathered; dry.</p>	<p><u>75.20-84.85':</u> Packer Test Interval #7.</p>
				<p><u>77.20-86.85':</u> Packer Test Interval #6.</p>
80				

LOG OF BOREHOLE

Location Rocky Flats Plant; Mound Area
Coordinates N 36644.48 E 23048.42
Total Depth 127.00'

Borehole/Well No. 20-87BR
Ground Surface Elevation 5968.10'
Water Level Encountered None
Static 5861.19' (12/01/87)

Drilling Company Boyles Bros
Date Drilled July 30-31 and Aug. 3, 1987
Drilling Method Hollow Stem Auger; Rotary Core
Logged By J.B. Bergman; K.D. Holliway
Geologist

Driller T. Merritt; P. Bushkovski
Helper T. High; J. Duncan; K. Parker
Drilling Fluid 0 - 51.70': None
51.70' - 127.0': Water
Checked By JJP
Site Manager

Comments Surface casing set to 51.64' by J.B. Bergman on August 4, 1987.
CEARP Manager

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
80			<u>50.0-54.0' SAMPLE.</u> Recovered 2.0/4.0' = 50%. RQD = 1.1/2.0' = 55%. CLAYSTONE: olive black (5 Y 2/1); un- weathered; damp.	
85			<u>54.0-58.0' SAMPLE.</u> Recovered 5.0/4.0' = 125%. RQD = 4.45/5.0' = 89%. CLAYSTONE: olive black (5 Y 2/1); some silt; unweathered; damp.	<u>86.86-96.50': Packer Test Interval #5.</u>
90			<u>58.0-62.0' SAMPLE.</u> Recovered 4.0/4.0' = 100%. RQD = 4.00/4.0' = 100%. 58.0-60.0': CLAYSTONE: dark gray; some silt; some very fine-grained sand; damp. 60.0-62.0': SANDY CLAYSTONE: light gray; some clay; some silt; some very fine- grained sand; fairly well sorted; sub- rounded; trace fossils (plant stems and leaves); dry.	
95			<u>62.0-66.0' SAMPLE.</u> Recovered 3.95/4.0' = 98.8%. RQD = 2.70/3.95' = 68.35%. SANDY CLAYSTONE: olive black (5 Y 2/1); sand is 3.0-3.5 phi to very fine- grained; subrounded; some silt; some clay; trace fossils (plant stems and leaves); damp to dry.	<u>96.50-106.15': Packer Test Interval #4.</u>
100				

LOG OF BOREHOLE

Location Rocky Flats Plant; Mound Area
Coordinates N 36644.48 E 23048.42
Total Depth 127.00'

Borehole/Well No. 20-87BR
Ground Surface Elevation 5968.10'
Water Level Encountered None
Static 5861.19' (12/01/87)

Drilling Company Boyles Bros
Date Drilled July 30-31 and Aug. 3, 1987
Drilling Method Hollow Stem Auger; Rotary Core
Logged By J.B. Bergman; K.D. Holliway
Geologist

Driller T. Merritt; P. Bushkovski
Helper T. High; J. Duncan; K. Parker
Drilling Fluid 0 - 51.70': None
Checked By 51.70' - 127.0': Water
Site Manager

Comments Surface casing set to 51.64' by J.B. Bergman on August 4, 1987.
CEARP Manager

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
100			<p><u>66.0-70.0' SAMPLE.</u> Recovered 3.7/4.0' = 92.5%. RQD = 2.91/3.7' = 78.6%. SANDY CLAYSTONE: same as above; very light gray (N 8/0) to grayish black (N 2/0); presence of vertical lamination planes of sand; very fine-grained to 3.0- 3.5 phi, starting at 67.1'; damp to dry.</p>	
105			<p><u>70.0-74.0' SAMPLE.</u> Recovered 5.2/4.0' = 130%. RQD = 4.8/5.2' = 92.3%. SANDY CLAYSTONE: same as above; vertical lamination planes fade out at 70.5' but reappear at 71.6'-72.8'; damp to dry.</p>	<p><u>106.15-115.80':</u> Packer Test Interval #2.</p>
110			<p><u>74.0-78.0' SAMPLE.</u> Recovered 4.0/4.0' = 100%. RQD = 3.0/4.0' = 60.5%. SANDY CLAYSTONE: same as above; damp to dry.</p>	<p><u>107.20-116.85':</u> Packer Test Interval #3.</p>
115			<p><u>78.0-79.5' SAMPLE.</u> Recovered 0.5/1.5' = 33.3%. RQD = 0.5/0.5' = 100%. SILTY CLAYSTONE: dark gray (N 3/0) to light gray (N 7/0); some clay; some silt; some sand 3.5-2.5 phi to very fine- grained; mottled; indurated; dry.</p>	<p><u>114.42-124.07':</u> Packer Test Interval #1.</p>
120			<p><u>79.5-82.0' SAMPLE.</u> Recovered 3.5/2.5' = 140%. RQD = 2.42/3.5' = 69.1%. SILTY CLAYSTONE: dark gray (N 3/0) to olive black (5 Y 2/1); some clay; some silt; some sand; occasional small seams of coal; damp.</p>	

LOG OF BOREHOLE

Location Rocky Flats Plant; Mound Area
Coordinates N 36644.48 E 23048.42
Total Depth 127.00'

Borehole/Well No. 20-87BR
Ground Surface Elevation 5968.10'
Water Level Encountered None
Static 5861.19' (12/01/87)

Drilling Company Boyles Bros
Date Drilled July 30-31 and Aug. 3, 1987
Drilling Method Hollow Stem Auger; Rotary Core
Logged By J.B. Bergman; K.D. Holliday
Geologist

Driller T. Merritt; P. Bushkovski
Helper T. High; J. Duncan; K. Parker
Drilling Fluid 0 - 51.70': None
51.70' - 127.0': Water
Checked By Site Manager

CEARP Manager

Comments Surface casing set to 51.64' by J.B. Bergman on August 4, 1987.

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
120			<u>82.0-84.5' SAMPLE.</u> Recovered 2.15/2.5' = 86%. RQD = 1.48/2.15 = 68.8%. SILTY CLAYSTONE: same as above except less sand; damp.	
125			<u>84.5-88.0' SAMPLE.</u> Recovered 3.1/3.5' = 88.6%. RQD = 2.68/3.1' = 86.5%. SILTY CLAYSTONE: same as above; except more sand in lenses; damp to dry.	
			<u>88.0-92.0' SAMPLE.</u> Recovered 4.0/4.0' = 100%. RQD = 3.76/4.0' = 94%. SILTY CLAYSTONE: same as above; damp.	
130			<u>92.0-96.0' SAMPLE.</u> Recovered 1.65/4.0' = 41.25%. RQD = 1.65/1.65' = 100%. SILTY CLAYSTONE: same as above; dry.	
			<u>96.0-99.0' SAMPLE.</u> Recovered 3.4/3.0' = 113%. RQD = 2.5/3.4' = 73.5%. SILTY CLAYSTONE: same as above; dry.	
			<u>99.0-102.0' SAMPLE.</u> Recovered 2.7/3.0' = 90%. RQD = 1.38/2.7' = 53%. SILTY CLAYSTONE: same as above; dry.	

LOG OF BOREHOLE

Location Rocky Flats Plant; Mound Area
Coordinates N 36644.48 E 23048.42
Total Depth 127.00'

Borehole/Well No. 20-87BR
Ground Surface Elevation 5968.10'
Water Level Encountered None
Static 5861.19' (12/01/87)

Drilling Company Boyles Bros
Date Drilled July 30-31 and Aug. 3, 1987
Drilling Method Hollow Stem Auger; Rotary Core
Logged By J.B. Bergman; K.D. Holliday
Geologist

Driller T. Merritt; P. Bushkovski
Helper T. High; J. Duncan; K. Parker
Drilling Fluid 0 - 51.70': None
51.70' - 127.0': Water
Checked By [Signature]
Site Manager

CEARP Manager

Comments Surface casing set to 51.64' by J.B. Bergman on August 4, 1987.

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			<u>102.0-105.0' SAMPLE.</u> Recovered 5.0/3.0' = 167%. RQD = 3.8/5.0' = 76%. SILTY CLAYSTONE: greenish black (5 GY 2/1); some clay; some silt; some sand lenses; thin sand lamination; recovered 2.0' of silty clay core from previous run; dry.	
			<u>105.0-109.0' SAMPLE.</u> Recovered 4.0/4.0' = 100%. RQD = 4.0/4.0' = 100%. 105-107.25': CLAYSTONE, SANDSTONE AND SILTSTONE: same as above; dry. 107.25'-109.0': CLAYEY SANDSTONE: olive black (5 Y 2/1); sand well sorted; subangular; 2.5-1.5 phi; clay in pockets; more prominent 108.75-109.0; moist.	
			<u>109.0-113.0' SAMPLE.</u> Recovered 4.0/4.0' = 100%. RQD = 4.0/4.0' = 100%. CLAYEY SANDSTONE: same as above; except finer grained 3.0-3.5 phi; well ce- mented; damp.	
			<u>113.0-117.0' SAMPLE.</u> Recovered 4.0/4.0' = 100%. RQD = 4.0/4.0' = 100%. 113.0-115.8': CLAYEY SANDSTONE: light gray (N 7/0); sand 3.0-3.5 phi; subangular; well cemented; moist. 115.8-117.0': SANDY CLAYSTONE: medium gray (5 N/0); some clay; some sand; some silt; blocky; moist.	

LOG OF BOREHOLE

Location Rocky Flats Plant; Mound Area
Coordinates N 36644.48 E 23048.42
Total Depth 127.00'

Borehole/Well No. 20-87BR
Ground Surface Elevation 5968.10'
Water Level Encountered None
Static 5861.19' (12/01/87)

Drilling Company Boyles Bros
Date Drilled July 30-31 and Aug. 3, 1987
Drilling Method Hollow Stem Auger; Rotary Core
Logged By J.B. Bergman; K.D. Holliway
Geologist

Driller T. Merritt; P. Bushkovski
Helper T. High; J. Duncan; K. Parker
Drilling Fluid 0 - 51.70': None
Checked By 51.70' - 127.0': Water
Site Manager

Comments Surface casing set to 51.64' by J.B. Bergman on August 4, 1987.
CEARP Manager

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			<u>117.0-121.0' SAMPLE.</u> Recovered 3.6/4.0' = 90%. RQD = 2.5/3.6' = 77.7%. 117-118.5': CLAYSTONE: medium gray (5 N/0); blocky; moderately cemented; moist. 118.5-119.5': CLAYEY SANDSTONE: light gray (N 7/0); moderate cementation; slightly moist. 119.5-121.0': CLAYSTONE: medium gray (5 N/0); sand fine-grained; moist.	
			<u>121.0-125.0' SAMPLE.</u> Recovered 1.5/4.0' = 37.5%. RQD = 1.2/1.5' = 80%. CLAYSTONE: same as above; massive; moist.	
			<u>125.0-127.0' SAMPLE.</u> Recovered 3.8/2.0' = 190%. RQD = 2.5/3.8' = 66%. CLAYSTONE: same as above; recovered 1.8' of claystone; same description from previous core run; moist.	
			TOTAL DEPTH: 127.00'	

WELL COMPLETION INFORMATION

Location Rocky Flats Plant; Mound Area

Coordinates N 36644.48 E 23048.42

Total Depth: Well 116.36'

Borehole 126.20'

Formation of Completion Arapahoe Formation

Casing Material Sch 5, type 316 TFJ stainless steel

Screen Material 0.010" wire wrap, type 316 TFJ stainless steel

Date Installed Aug 12, 1987

Installed By K.D. Holliway
Geologist

Well No. 20-87BR

Elevation: Ground Surface 5968.10'

Top of Casing 5970.10'

Casing Diameter 2" ID

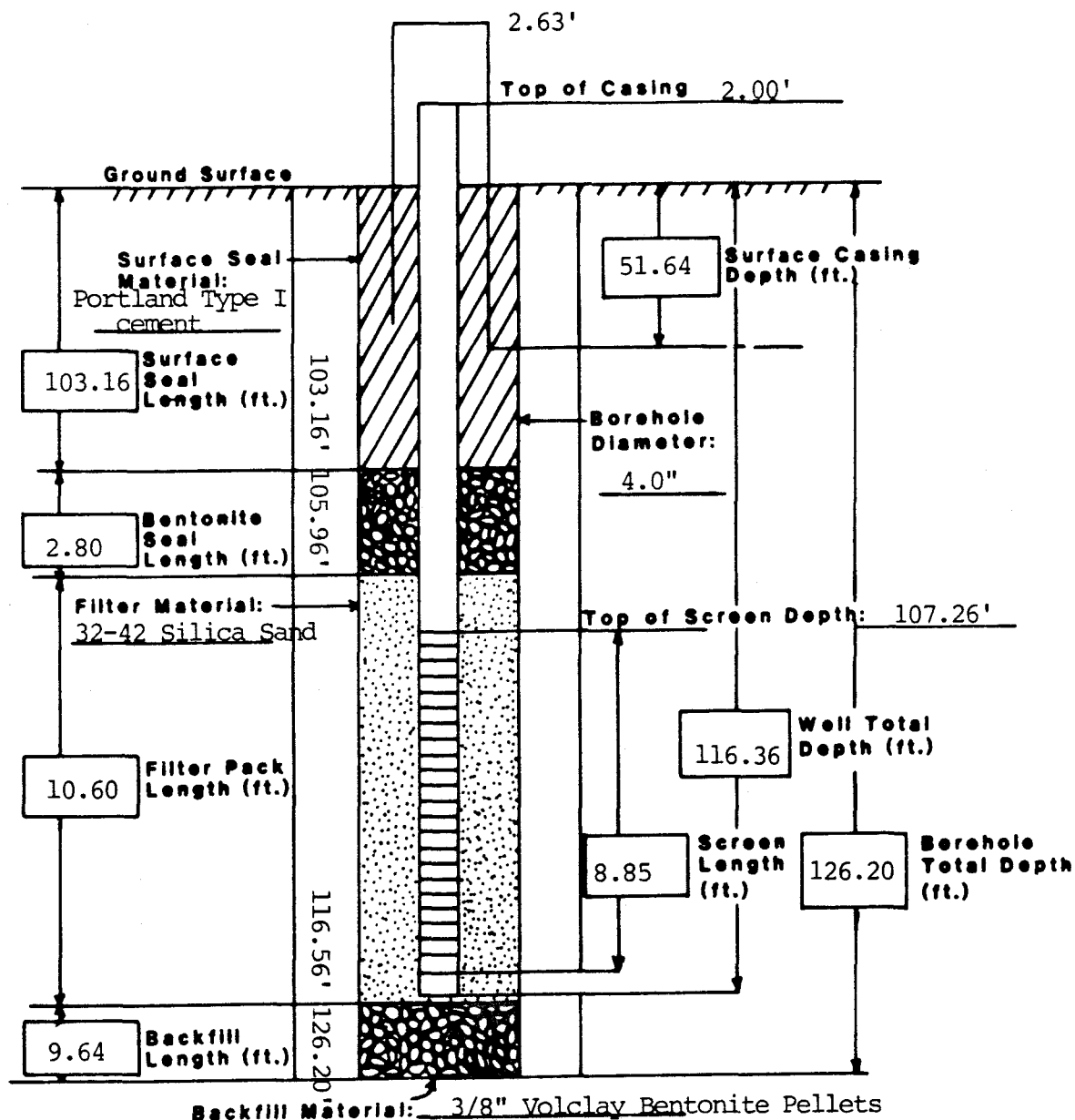
Surface Casing Diameter 5" ID

Approved By J. Pasalle

Site Manager

CEARP Manager

Comments Surface casing set to 51.64' by J.B. Bergman on August 4, 1987.



PACKER TEST ANALYSIS

WELL NO. 20-87BR

ROCKY FLATS PLANT; MOUND AREA

JOB NO. 2029-17-02

DATE TESTED: 8/11/87

BY: K.D. HOLLIWAY

TEST INTERVAL (FEET BELOW G.S.): 53.90 - 63.55

MATERIAL TESTED: ARAPAHOE CLAYSTONE

DEPTH TO WATER (FEET BELOW G.S.): 106.91

$$K = \frac{Q}{2(PI)(L)(H)} \ln\left(\frac{L}{R}\right)$$

1ST P1/3 TEST

Q = INJECTION RATE = .00023169 (FEET³/MIN)

L = LENGTH OF TEST INTERVAL = 9.65 FEET

TEST INTERVAL IS ABOVE WATER TABLE

HEAD = DEPTH OF CENTER OF INTERVAL + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)

= 58.72 + 7.02 + .00 * 2.31 = 65.74

R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .0000002360 FT/MIN

K = .00000012 CM/SEC

P2/3 TEST

Q = INJECTION RATE = .00013032 (FEET³/MIN)

L = LENGTH OF TEST INTERVAL = 9.65 FEET

TEST INTERVAL IS ABOVE WATER TABLE

HEAD = DEPTH OF CENTER OF INTERVAL + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)

= 58.72 + 5.32 + 13.60 * 2.31 = 95.46

R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .0000000914 FT/MIN

K = .00000005 CM/SEC

2ND P1/3 TEST

PACKER TEST ANALYSIS

WELL NO. 20-87BR

ROCLY FLATS PLANT; MOUND AREA

JOB NO. 2029-17-02

DATE TESTED: 8/11/87

BY: K.D. HOLLIWAY

TEST INTERVAL (FEET BELOW G.S.): 65.55 - 75.20

MATERIAL TESTED: ARAPAHOE CLAYSTONE

DEPTH TO WATER (FEET BELOW G.S.): 106.91

$$K = \frac{Q}{2(\pi)(L)(H)} \ln\left(\frac{L}{R}\right)$$

1ST P1/3 TEST

P2/3 TEST

Q = INJECTION RATE = .00010136 (FEET³/MIN)

L = LENGTH OF TEST INTERVAL = 9.65 FEET

TEST INTERVAL IS ABOVE WATER TABLE

HEAD = DEPTH OF CENTER OF INTERVAL + GAGE HEIGHT

+ GAGE PRESSURE (IN FEET)

= 70.38 + 5.32 + 16.40 * 2.31 = 113.58

R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .0000000598 FT/MIN

K = .00000003 CM/SEC

2ND P1/3 TEST

PACKER TEST ANALYSIS

WELL NO. 20-87BR

ROCKY FLATS PLANT; MOUND AREA

JOB NO. 2029-17-02

DATE TESTED: 8/11/87

BY: K.D. HOLLIWAY

TEST INTERVAL (FEET BELOW G.S.): 75.20 - 84.85

MATERIAL TESTED: ARAPAHOE CLAYSTONE

DEPTH TO WATER (FEET BELOW G.S.): 106.91

$$K = \frac{Q}{2(\pi)(L)(H)} \ln\left(\frac{L}{R}\right)$$

1ST P1/3 TEST

P2/3 TEST

Q = INJECTION RATE = .00014480 (FEET³/MIN)

L = LENGTH OF TEST INTERVAL = 9.65 FEET

TEST INTERVAL IS ABOVE WATER TABLE

HEAD = DEPTH OF CENTER OF INTERVAL + GAGE HEIGHT

+ GAGE PRESSURE (IN FEET)

= 80.02 + 5.32 + 18.70 * 2.31 = 128.54

R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .0000000754 FT/MIN

K = .00000004 CM/SEC

2ND P1/3 TEST

PACKER TEST ANALYSIS

WELL NO. 20-87BR

ROCKY FLATS PLANT; MOUND AREA

JOB NO. 2029-17-02

DATE TESTED: 8/11/87

BY: K.D. HOLLIWAY

TEST INTERVAL (FEET BELOW G.S.): 86.85 - 96.50

MATERIAL TESTED: ARAPAHOE CLAYSTONE

DEPTH TO WATER (FEET BELOW G.S.): 106.91

$$K = \frac{Q}{2(\pi)(L)(H)} \ln\left(\frac{L}{R}\right)$$

1ST P1/3 TEST

P2/3 TEST

Q = INJECTION RATE = .00040545 (FEET³/MIN)

L = LENGTH OF TEST INTERVAL = 9.65 FEET

TEST INTERVAL IS ABOVE WATER TABLE

HEAD = DEPTH OF CENTER OF INTERVAL + GAGE HEIGHT

+ GAGE PRESSURE (IN FEET)

= 91.68 + 5.32 + 21.50 * 2.31 = 146.66

R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .0000001851 FT/MIN

K = .00000009 CM/SEC

2ND P1/3 TEST

PACKER TEST ANALYSIS

WELL NO. 20-87BR

ROCKY FLATS PLANT; MOUND AREA

JOB NO. 2029-17-02

DATE TESTED: 08/10/87

BY: K.D. HOLLIWAY

TEST INTERVAL (FEET BELOW G.S.): 96.50 - 106.15

MATERIAL TESTED: ARAPAHOE CLAYSTONE

DEPTH TO WATER (FEET BELOW G.S.): 106.91

$$K = \frac{Q}{2(\pi)(L)(H)} \ln\left(\frac{L}{R}\right)$$

1ST P1/3 TEST

P2/3 TEST

Q = INJECTION RATE = .00049234 (FEET³/MIN)

L = LENGTH OF TEST INTERVAL = 9.65 FEET

TEST INTERVAL IS ABOVE WATER TABLE

HEAD = DEPTH OF CENTER OF INTERVAL + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)

= 101.32 + 5.32 + 23.80 * 2.31 = 161.62

R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .00000020 FT/MIN

K = .00000010 CM/SEC

2ND P1/3 TEST

PACKER TEST ANALYSIS

WELL NO. 20-87BR

ROCKY FLATS PLANT; MOUND AREA

JOB NO. 2029-17-02

DATE TESTED: 8/10/87

BY: K.D. HOLLIWAY

TEST INTERVAL (FEET BELOW G.S.): 107.20 - 116.85

MATERIAL TESTED: ARAPAHOE SANDSTONE

DEPTH TO WATER (FEET BELOW G.S.): 106.91

$$K = \frac{Q}{2(\pi)(L)(H)} \ln\left(\frac{L}{R}\right)$$

1ST P1/3 TEST

Q = INJECTION RATE = .00001448 (FEET³/MIN)

L = LENGTH OF TEST INTERVAL = 9.65 FEET

TEST INTERVAL IS BELOW WATER TABLE

HEAD = DEPTH TO WATER + GAGE HEIGHT

+ GAGE PRESSURE (IN FEET)

= 106.91 + 9.37 + .00 * 2.31 = 116.28

R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .0000000083 FT/MIN

K = .00000000 CM/SEC

P2/3 TEST

Q = INJECTION RATE = .00050682 (FEET³/MIN)

L = LENGTH OF TEST INTERVAL = 9.65 FEET

TEST INTERVAL IS BELOW WATER TABLE

HEAD = DEPTH TO WATER + GAGE HEIGHT

+ GAGE PRESSURE (IN FEET)

= 106.91 + 5.32 + 29.30 * 2.31 = 179.91

R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .0000001886 FT/MIN

K = .00000010 CM/SEC

2ND P1/3 TEST

PACKER TEST ANALYSIS

WELL NO. 20-87BR

ROCKY FLATS PLANT; MOUND AREA

JOB NO. 2029-17-02

DATE TESTED: 8/10/87

BY: K.D. HOLLIWAY

TEST INTERVAL (FEET BELOW G.S.): 106.15 - 115.80

MATERIAL TESTED: ARAPAHOE SANDSTONE

DEPTH TO WATER (FEET BELOW G.S.): 106.91

$$K = \frac{Q}{2(\pi)(L)(H)} \ln\left(\frac{L}{R}\right)$$

1ST P1/3 TEST

P2/3 TEST

Q = INJECTION RATE = .00051406 (FEET³/MIN)

L = LENGTH OF TEST INTERVAL = 9.65 FEET

TEST INTERVAL IS ABOVE WATER TABLE

HEAD = DEPTH OF CENTER OF INTERVAL + GAGE HEIGHT

+ GAGE PRESSURE (IN FEET)

= 110.98 + 5.32 + 26.00 * 2.31 = 176.36

R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .0000001952 FT/MIN

K = .00000010 CM/SEC

2ND P1/3 TEST

PACKER TEST ANALYSIS

WELL NO. 20-87BR

ROCKY FLATS PLANT; MOUND AREA

JOB NO. 2029-17-02

DATE TESTED: 8/10/87

BY: K.D. HOLLIWAY

TEST INTERVAL (FEET BELOW G.S.): 114.42 - 124.07

MATERIAL TESTED: ARAPAHOE SANDSTONE

DEPTH TO WATER (FEET BELOW G.S.): 106.91

$$K = \frac{Q}{2(PI)(L)(H)} \ln\left(\frac{L}{R}\right)$$

1ST P1/3 TEST

Q = INJECTION RATE = .00380837 (FEET³/MIN)

L = LENGTH OF TEST INTERVAL = 9.65 FEET

TEST INTERVAL IS BELOW WATER TABLE

HEAD = DEPTH TO WATER + GAGE HEIGHT

+ GAGE PRESSURE (IN FEET)

= 106.91 + 9.95 + .00 * 2.31 = 116.86

R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .0000021820 FT/MIN

K = .00000111 CM/SEC

P2/3 TEST

Q = INJECTION RATE = .00024617 (FEET³/MIN)

L = LENGTH OF TEST INTERVAL = 9.65 FEET

TEST INTERVAL IS BELOW WATER TABLE

HEAD = DEPTH TO WATER + GAGE HEIGHT

+ GAGE PRESSURE (IN FEET)

= 106.91 + 5.32 + 28.20 * 2.31 = 177.37

R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .0000000929 FT/MIN

K = .00000005 CM/SEC

2ND P1/3 TEST

PACKER TEST DATA SHEET

Job No.: 2029-17-02

Location: Rocky Flats Plant; Mound Area

Well No.: 20-87BR

Borehole Diameter: 0.333'

Acrylic Tube Diameter: 0.1663'

Static Water Level: 106.91'

Date of Water Level: 12/1/87

Page 1 of 2

Comments: Test Intervals # 2, 4, 7, and 8 are invalid due to water gain in tube on first 1/3 pressure test; test intervals # 1, 3, 5, and 10 gained water in tube on second 1/3 pressure test.

Test Interval No.	Top of Test Interval	Bottom of Test Interval	Test Length (minutes)	Gage Pressure	Gage Height	Avg. H ₂ O Height	Gage Height + Avg. H ₂ O Height	Δh	Date of Test	Lithology	Geologist
1	114.42	124.07	15	0	5.32	4.63	9.95	2.63	8/10/87	Kass/ KCL	KDH
			15	28.2	5.32	N/A	5.32	0.17	8/10/87	Kass/ KCL	KDH
			15	0	5.32	3.86	9.18	-0.19	8/10/87	Kass/ KCL	KDH
2	106.15	115.80	15	0	5.32	4.18	9.50	-0.01	8/10/87	Kass	KDH
			15	26	5.32	N/A	5.32	0.355	8/10/87	Kass	KDH
			15	0	5.32	3.76	9.08	-0.045	8/10/87	Kass	KDH
3	107.20	116.85	15	0	5.32	4.05	9.37	0.010	8/10/87	Kass	KDH
			15	29.3	5.32	N/A	5.32	0.35	8/10/87	Kass	KDH
			15	0	5.32	4.34	9.66	-0.13	8/10/87	Kass	KDH
4	96.50	106.15	15	0	5.32	2.93	8.25	-0.075	8/10/87	KCL	KDH
			15	23.8	5.32	N/A	5.32	0.34	8/10/87	KCL	KDH
			15	0	5.32	2.72	8.04	-0.02	8/10/87	KCL	KDH
5	86.85	96.50	15	0	5.32	4.14	9.46	0.00	8/11/87	KCL	KDH
			15	21.5	5.32	N/A	5.32	0.28	8/11/87	KCL	KDH
			15	0	5.32	2.68	8.18	-0.02	8/11/87	KCL	KDH
7	75.20	84.85	15	0	5.32	2.84	8.16	-0.045	8/11/87	KCL	KDH
			15	18.7	5.32	N/A	5.32	0.10	8/11/87	KCL	KDH
			15	0	5.32	2.67	7.99	-0.05	8/11/87	KCL	KDH

Job No.: 2029-17-02

Location: Rocky Flats Plant; Mound Area

Well No.: 20-87BR (CON'T)

Borehole Diameter: 0.333'

Acrylic Tube Diameter: 0.1663"

Comments:

Static Water Level: 106.91'

Date of Water Level: 12/1/87

Page 2 of 2

[illegible]

12/11/87

Water Level Data
for
Rockwell (Rocky Flats)

<u>Date Measured</u>	<u>Depth to Water from TOC</u>	<u>Elevation TOC (ft)</u>	<u>Water Level Elev. (ft)</u>
** Well Number: 2087BR			
12/01/87	108.91	5970.10	5861.19

INDEX OF DATA

Boring No.: 21-87

Completed as well? Yes

Data in File

- ☒ Log of Borehole
- ☒ Well Construction Summaries
- ☐ Well Development Summaries
- ☐ Hydraulic Conductivity Test Data
and Results
- ☐ Packer Test Data and Results
- ☒ Water Level Data

LOG OF BOREHOLE

Location Rocky Flats Plant; Mound Area
Coordinates N 36980.21 E 22693.84
Total Depth 17.00'

Borehole/Well No. 21-87
Ground Surface Elevation 5927.58'
Water Level Encountered 7.0'
Static Dry

Drilling Company Boyles Bros
Date Drilled October 16, 1987
Drilling Method Hollow Stem Auger
Logged By K. D. Holliway
Geologist

Driller R. Sharp
Helper T. Merritt
Drilling Fluid None
Checked By J. J. Passafium
Site Manager
Brent Lewis
CEAMP Manager

Comments

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
0			<u>COLLUVIUM</u>	
			<u>0.0-2.0' SAMPLE.</u> Recovered 1.9/2.0' = 95%. SANDY CLAY: dark yellowish brown (10 YR 4/2) to dusky yellowish brown (10 YR 2/2); quartzite cobbles, broken to subangular; sand very fine-grained; poorly sorted; unconsolidated; grass and roots to 0.2'; reactive to HCl; damp.	HNu Background=1.3 OVA Background=2.8 Alpha Background = 0.1 <u>0.0-2.0'</u> : Readings on core: HNu = 7.0; OVA = 3.2.
5			<u>2.0-4.0' SAMPLE.</u> Recovered 1.0/2.0' = 50%. SANDY CLAY: same as above; damp.	<u>2.0-4.0'</u> : Readings on core: HNu = 200; OVA = 3.6.
10			<u>4.0-7.0' SAMPLE.</u> Recovered 0.3/3.0' = 10%. CLAY: light olive gray (5 Y 5/2); broken quartzite cobbles; trace very fine-grained sand; unconsolidated; damp.	<u>7.0-9.5'</u> : Readings on core: HNu = 5.0; OVA = 3.8.
15			<u>7.0-9.5' SAMPLE.</u> Recovered 2.5/2.5' = 100%. 7.0-8.8': CLAY: light olive gray (5 Y 5/2); occasional subrounded quartzite pebbles; trace very fine-grained sand; some iron nodules; damp to moist. 8.8-9.5': SANDY CLAY: dusky yellowish brown (10 YR 2/2); very fine-grained sand; some organics; moist to wet.	
20				

LOG
OF
BOREHOLE

Location Rocky Flats Plant; Mound Area
Coordinates N 36980.21 E 22693.84
Total Depth 17.00'

Borehole/Well No. 21-87
Ground Surface Elevation 5927.58'
Water Level Encountered 7.0'
Static Dry

Drilling Company Boyles Bros
Date Drilled October 16, 1987
Drilling Method Hollow Stem Auger
Logged By K. D. Holliway
Geologist

Driller R. Sharp
Helper T. Merritt
Drilling Fluid None
Checked By *A. J. Pasche*
Site Manager

CEARP Manager

Comments _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			<u>9.5-12.0' SAMPLE.</u> Recovered 2.5/2.5' = 100%. 9.5-10.4': SANDY CLAY: light olive gray (5 Y 5/2); occasional subrounded to rounded quartzite pebbles; very fine-grained sand; trace caliche; damp to moist.	
			<u>ARAPAHOE FORMATION</u>	
			10.4-12.0': SANDY CLAYSTONE: light olive gray (5 Y 5/2) to medium gray (N 5/0) with dark yellowish orange (10 YR 6/6) iron staining; very fine-grained sand; trace caliche; damp to moist.	
			<u>12.0-14.5' SAMPLE.</u> Recovered 2.5/2.5' = 100%. CLAYSTONE: same as above; damp to moist.	
			<u>14.5-17.0' SAMPLE.</u> Recovered 2.3/2.5' = 92%. CLAYSTONE: olive gray (5 Y 4/1) with trace dark yellowish orange (10 YR 6/6) iron staining; some very fine-grained sand more than above; trace caliche; damp to moist.	
			TOTAL DEPTH: 17.00'	

WELL COMPLETION INFORMATION

Location Rocky Flats Plant; Mound Area

Coordinates N 36980.21 E 22693.84

Total Depth: Well 10.555'

Borehole 17.00'

Well No. 21-87

Elevation: Ground Surface 5927.58'

Top of Casing 5929.36'

Formation of Completion Rocky Flats Alluvium

Casing Material Sch 5, type 316 TFJ stainless steel

Casing Diameter 2" ID

Screen Material 0.010" wire wrap, type 316 TFJ stainless steel

Surface Casing Diameter 5" ID

Date Installed Oct. 16, 1987

Approved By [Signature]

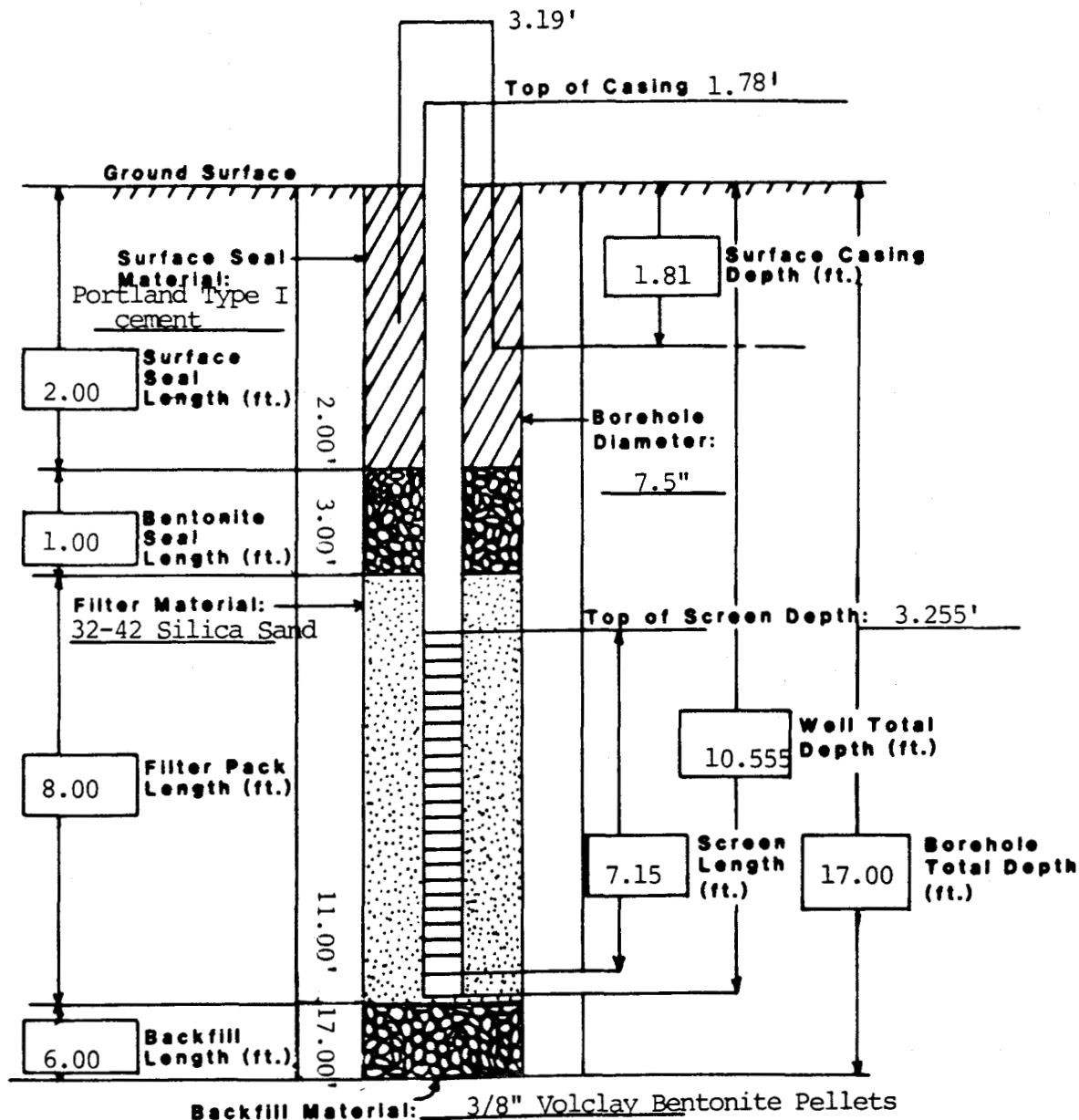
Installed By K. D. Holliday

Geologist

Site Manager

CEARP Manager

Comments _____



12/11/87

Water Level Data
for
Rockwell (Rocky Flats)

<u>Date Measured</u>	<u>Depth to Water from TOC</u>	<u>Elevation TOC (ft)</u>	<u>Water Level Elev. (ft)</u>
--------------------------	------------------------------------	-------------------------------	-----------------------------------

** Well Number: 2187

12/01/87	-1.00	5929.36	
----------	-------	---------	--

INDEX OF DATA

Boring No.: 22-87BR

Completed as well? Yes

Data in File

- ☒ Log of Borehole
- ☒ Well Construction Summaries
- ☐ Well Development Summaries
- ☐ Hydraulic Conductivity Test Data
and Results
- ☒ Packer Test Data and Results
- ☒ Water Level Data

LOG OF BOREHOLE

Location Rocky Flats Plant; Mound Area
Coordinates N 36934.99 E 22715.72
Total Depth 110.40'

Borehole/Well No. 22-87BR
Ground Surface Elevation 5930.70'
Water Level Encountered 12.2'
Static 5852.04' (12/01/87)

Drilling Company Boyles Bros
Date Drilled Sept 30 & Oct 7-8, 1987
Drilling Method Hollow Stem Auger; Rotary Core
Logged By K.D. Holliway; J.B. Beroman
Geologist

Driller R. Sharp
Helper T. Merritt
Drilling Fluid 0.0 - 45.1' None;
45.1' - 110.4' Water
Checked By Brent Platts
Site Manager
CEAMP Manager

Comments Surface casing set to 43.59' by K.D. Holliway on October 2, 1987

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
0			<u>COLLUVIUM</u>	
			<u>0.0-2.0' SAMPLE.</u> Recovered 2.0/2.0' = 100%. CLAYEY SAND: moderate yellowish brown (10 YR 4/2) to dusky yellowish brown (10 YR 2/2); subrounded to subangular quartzite cobbles and pebbles; sand fine-grained to coarse-grained; poorly sorted; calcareous; unconsolidated; some caliche; dry.	HNu Background=0.6 OVA Background=1.2 <u>0-2.0'</u> : Readings on core: HNu = 1.0; OVA = 4.0.
5			<u>2.0-4.0' SAMPLE.</u> Recovered 1.5/2.0' = 75%. CLAYEY SAND: same as above; dry.	<u>2.0-4.0'</u> : Readings on core: HNu = 4.0; OVA = 1.2.
			<u>4.0-6.0' SAMPLE.</u> Recovered 2.0/2.0' = 100%. CLAY: light olive gray (5 Y 5/2) to dusky yellowish brown (10 YR 2/2); trace subrounded quartzite cobbles; trace very fine-grained sand; trace caliche; damp.	<u>4.0-6.0'</u> : Readings on core: HNu = Background; OVA = 1.6.
10			<u>6.0-8.0' SAMPLE.</u> Recovered 2.0/2.0' = 100%. CLAY: same as above except with dark yellowish orange (10 YR 6/6) iron staining and stringers of brownish gray (5 YR 4/1) claystone; damp.	<u>6.0-8.0'</u> : Readings on core: HNu = 1.2; OVA = 10.
			<u>8.0-10.2' SAMPLE.</u> Recovered 2.2/2.2' = 100%. CLAY: light olive brown (5 Y 5/6) to light olive gray (5 Y 5/2); some iron staining; some sand; trace caliche; damp.	<u>8.0'</u> : Readings in augers: OVA = 100.0; HNu = 1.2. <u>8.0-10.2'</u> : Readings in core: HNu = Background; OVA = 2.0.
15				<u>10.2-12.2'</u> : Readings on core: HNu = 2.0; OVA = 20.
20				

LOG OF BOREHOLE

Location Rocky Flats Plant; Mound Area
Coordinates N 36934.99 E 22715.72
Total Depth 110.40'

Borehole/Well No. 22-87BR
Ground Surface Elevation 5930.70'
Water Level Encountered 12.2'
Static 5852.04' (12/01/87)

Drilling Company Boyles Bros
Date Drilled Sept 30 & Oct 7-8, 1987
Drilling Method Hollow Stem Auger; Rotary Core
Logged By K.D. Holliway; J.B. Beroman
Geologist

Driller R. Sharp
Helper T. Merritt
Drilling Fluid 0.0 - 45.1' None;
45.1' - 110.4' Water
Checked By [Signature]
Site Manager

CEARP Manager

Comments Surface casing set to 43.59' by K.D. Holliway on October 2, 1987

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
20			<u>10.2-12.2' SAMPLE.</u> Recovered 2.0/2.0' = 100%. CLAY: light olive gray (5 Y 5/2); some very fine-grained sand stained dark yellowish orange (10 YR 6/6); subrounded quartzite cobbles; some iron staining; trace caliche; damp.	<u>12.2-26.5':</u> No readings above background on the core.
25			<u>12.2-14.2' SAMPLE.</u> Recovered 2.0/2.0' = 100%. 12.2-12.8': SANDY CLAY: same as above; moist to wet.	<u>26.5-27.5':</u> Readings on core: HNu = Background; OVA = 1.6.
			<u>ARAPAHOE FORMATION</u>	
30			12.8-14.2': SANDY CLAYSTONE: same as above except no quartzite cobbles; moist to wet.	<u>28.5-29.5':</u> Readings on core: HNu = 2.0; OVA = 1.0.
			<u>14.2-16.2' SAMPLE.</u> Recovered 2.0/2.0' = 100%. CLAYSTONE: light olive gray (5 Y 5/2); some very fine-grained sand; some dusky yellow (5 Y 6/4); trace caliche; damp to moist.	
35			<u>16.2-18.2' SAMPLE:</u> Recovered 2.0/2.0' = 100%. CLAYSTONE: olive gray (5 Y 4/1); occasional dark yellowish orange (10 YR 6/6) iron staining; trace very fine-grained sand; trace caliche; damp.	
			<u>18.2-20.2' SAMPLE.</u> Recovered 2.0/2.0' = 100%. CLAYSTONE: same as above; damp.	
40				

LOG OF BOREHOLE

Location Rocky Flats Plant; Mound Area
Coordinates N 36934.99 E 22715.72
Total Depth 110.40'

Borehole/Well No. 22-87BR
Ground Surface Elevation 5930.70'
Water Level Encountered 12.2'
Static 5852.04' (12/01/87)

Drilling Company Boyles Bros
Date Drilled Sept 30 & Oct 7-8, 1987
Drilling Method Hollow Stem Auger; Rotary Core
Logged By K.D. Holliway; J.B. Bergman
Geologist

Driller R. Sharo
Helper T. Merritt
Drilling Fluid 0.0 - 45.1' None;
45.1' - 110.4' Water
Checked By Site Manager

CEARP Manager

Comments Surface casing set to 43.59' by K.D. Holliway on October 2, 1987

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
40			<u>20.2-22.2' SAMPLE.</u> Recovered 2.0/2.0' = 100%. CLAYSTONE: same as above; damp. Hole readjusted to 22.50'.	
45			<u>22.5-23.5' SAMPLE.</u> Recovered 1.5/1.0' = 150%. CLAYSTONE: same as above except light olive gray (5 Y 5/2) with trace dark yel- lowish orange (10 YR 6/6) iron staining; no caliche; dry.	<u>45.60-52.55':</u> Packer Test Interval #7.
50			<u>23.5-24.5' SAMPLE.</u> Recovered 1.0/1.0' = 100%. CLAYSTONE: same as above except no iron staining; homogenous; dry to slightly damp.	
			<u>24.5-25.5' SAMPLE.</u> Recovered 1.4/1.0' = 140%. CLAYSTONE: same as above; dry to slightly damp.	<u>52.55-62.20':</u> Packer Test Interval #6.
55			<u>25.5-26.5' SAMPLE.</u> Recovered 1.4/1.0' = 140%. CLAYSTONE: light olive gray (5 Y 5/2) with trace dark yellowish orange (10 YR 6/6) iron staining in small fractures; trace very fine-grained sand; trace silt; damp to dry.	
			<u>26.5-27.5' SAMPLE.</u> Recovered 1.2/1.0' = 120%. CLAYSTONE: same as above; damp.	
60				

LOG OF BOREHOLE

Location Rocky Flats Plant; Mound Area
Coordinates N 36934.99 E 22715.72
Total Depth 110.40'

Borehole/Well No. 22-87BR
Ground Surface Elevation 5930.70'
Water Level Encountered 12.2'
Static 5852.04' (12/01/87)

Drilling Company Boyles Bros
Date Drilled Sept 30 & Oct 7-8, 1987
Drilling Method Hollow Stem Auger; Rotary Core
Logged By K.D. Holliway; J.B. Bergman
Geologist

Driller R. Sharo
Helper T. Merritt
Drilling Fluid 0.0 - 45.1' None;
45.1' - 110.4' Water
Checked By Site Manager

CEARP Manager

Comments Surface casing set to 43.59' by K.D. Holliway on October 2, 1987

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
60			<u>27.5-28.5' SAMPLE.</u> Recovered 1.5/1.0' = 150%. CLAYSTONE: same as above; damp to moist.	<u>62.20-71.85': Packer Test Interval #5.</u>
			<u>28.5-29.5' SAMPLE.</u> Recovered 1.5/1.0' = 150%. CLAYSTONE: same as above except more iron staining; damp.	
65			<u>29.5-30.5' SAMPLE.</u> Recovered 1.5/1.0' = 150%. CLAYSTONE: same as above; trace organics; damp.	
			<u>30.5-31.5' SAMPLE.</u> Recovered 1.5/1.0' = 150%. SANDY CLAYSTONE: light olive gray (5 Y 5/2) with dark yellowish orange (10 YR 6/6) iron staining and grayish orange (10 YR 7/4) very fine-grained interbedded sands; occasional limonite nodules; some silt; some organics; dry.	<u>71.85-81.50': Packer Test Interval #4.</u>
70			<u>31.5-32.5' SAMPLE.</u> Recovered 1.0/1.0' = 100%. SANDY CLAYSTONE: olive black (5 Y 2/1) to light olive gray (5 Y 5/2); limonite nodules and iron staining moderate brown (5 YR 4/4); very fine-grained interbedded sands, grayish orange (10 YR 7/4); some silt; trace organics; dry.	
75				
80				

LOG OF BOREHOLE

Location Rocky Flats Plant; Mound Area
Coordinates N 36934.99 E 22715.72
Total Depth 110.40'

Borehole/Well No. 22-87BR
Ground Surface Elevation 5930.70'
Water Level Encountered 12.2'
Static 5852.04' (12/01/87)

Drilling Company Boyles Bros
Date Drilled Sept 30 & Oct 7-8, 1987
Drilling Method Hollow Stem Auger; Rotary Core
Logged By K.D. Holliway; J.B. Bergman
Geologist

Driller R. Sharp
Helper T. Merritt
Drilling Fluid 0.0 - 45.1' None;
45.1' - 110.4' Water
Checked By [Signature]
Site Manager

CEARP Manager

Comments Surface casing set to 43.59' by K.D. Holliway on October 2, 1987

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
80			<u>32.5-33.5' SAMPLE.</u> Recovered 1.2/1.0' = 120%. CLAYSTONE: same as above except no interbedded sands; no nodules; less sand; dry.	<u>81.50-91.15': Packer Test Interval #3.</u> <u>82.70-92.35': Packer Test Interval #2.</u>
85			<u>33.5-34.5' SAMPLE.</u> Recovered 1.5/1.0' = 150%. CLAYSTONE: light olive gray (5 Y 5/2) to olive black (5 Y 2/1) with some mod- erate yellowish brown iron staining (10 YR 5/4); some very fine-grained sand; some silt; some organics; brittle; dry.	
90			<u>34.5-35.5' SAMPLE.</u> Recovered 1.0/1.0' = 100%. CLAYSTONE: same as above; dry.	
95			<u>35.5-36.5' SAMPLE.</u> Recovered 1.5/1.0' = 150%. CLAYSTONE: olive black (5 Y 2/1) to grayish black (N 2/0); some very fine- grained sand; some silt; some organics; trace limonite nodules; dry. Weathered/ unweathered contact = 36.0'.	<u>92.35-102.0': Packer Test Interval #1.</u>
100			<u>36.5-37.5' SAMPLE.</u> Recovered 2.0/1.0' = 200%. CLAYSTONE: olive black (5 Y 2/1); some very fine-grained sand in fractures with dark yellowish orange (10 YR 6/6) iron staining; some organics; dry to slightly damp.	

LOG OF BOREHOLE

Location Rocky Flats Plant; Mound Area
Coordinates N 36934.99 E 22715.72
Total Depth 110.40'

Borehole Well No. 22-87BR
Ground Surface Elevation 5930.70'
Water Level Encountered 12.2'
Static 5852.04' (12/01/87)

Drilling Company Boyles Bros
Date Drilled Sept 30 & Oct 7-8, 1987
Drilling Method Hollow Stem Auger; Rotary Core
Logged By K.D. Holliway; J.B. Bergman
Geologist

Driller R. Sharp
Helper T. Merritt
Drilling Fluid 0.0 - 45.1' None;
45.1' - 110.4' Water
Checked By Site Manager

CEARP Manager

Comments Surface casing set to 43.59' by K.D. Holliway on October 2, 1987

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
100			<p><u>37.5-38.5' SAMPLE.</u> Recovered 1.0/1.0' = 100%. CLAYSTONE: same as above with more sands; dry.</p>	
105			<p><u>38.5-39.5' SAMPLE.</u> Recovered 1.3/1.0' = 130%. CLAYSTONE: olive black (5 Y 2/1) to dark gray (N 3/0); some very fine-grained sand with moderate yellowish brown (10 YR 5/4) staining; some silt; some organ- ics; dry.</p>	
110			<p><u>39.5-40.5' SAMPLE.</u> Recovered 1.2/1.0' = 120%. CLAYSTONE: same as above with less sands and less iron staining; dry.</p>	
115			<p><u>40.5-41.5' SAMPLE.</u> Recovered 1.2/1.0' = 120%. CLAYSTONE: olive black (5 Y 2/1) to dark gray (N 3/0); very fine-grained cal- careous sand in fractures with moderate yellowish brown (10 YR 5/4) staining; at 41.2' band of caliche (or calcareous sand) reacts strongly with HCl; some organics; dry.</p>	
			<p><u>41.5-42.5' SAMPLE.</u> Recovered 1.5/1.0' = 150%. CLAYSTONE: same as above; dry.</p>	
			<p><u>42.5-43.5' SAMPLE.</u> Recovered 1.4/1.0' = 140%. CLAYSTONE: same as above; dry.</p>	

LOG OF BOREHOLE

Location Rocky Flats Plant; Mound Area
Coordinates N 36934.99 E 22715.72
Total Depth 110.40'

Borehole Well No. 22-87BR
Ground Surface Elevation 5930.70'
Water Level Encountered 12.2'
Static 5852.04' (12/01/87)

Drilling Company Boyles Bros
Date Drilled Sept 30 & Oct 7-8, 1987
Drilling Method Hollow Stem Auger; Rotary Core
Logged By K.D. Holliway; J.B. Beroman
Geologist

Driller R. Sharp
Helper T. Merritt
Drilling Fluid 0.0 - 45.1' None;
45.1' - 110.4' Water
Checked By [Signature]
Site Manager

CEARP Manager

Comments Surface casing set to 43.59' by K.D. Holliway on October 2, 1987

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			<u>45.1-49.50' SAMPLE.</u> Recovered 3.7/4.5' = 82%. RQD = 2.6/3.7' = 70%. 45.1-45.6': CLAYSTONE: dark greenish gray (5 GY 4/1); dense; very broken; probably slough. 45.6-47.4': SANDSTONE: dark greenish gray (5 GY 4/1); fine-grained; well sorted; some moderate brown (5 YR 4/4) iron stains; trace organics; fracture (~80°) at 46.5-46.7' filled with iron stains; moist. 47.4-49.5': CLAYSTONE: dark greenish gray (5 GY 4/1); dense; no stains; homogenous; dry to moist.	
			<u>49.5-52.5' SAMPLE.</u> Recovered 2.7/3.0' = 90%. RQD = 1.2/2.7' = 44%. CLAYSTONE: olive gray (5 Y 3/2); no silt; no sand; homogenous; trace organic fragments; consolidated; moist.	
			<u>52.5-56.5' SAMPLE.</u> Recovered 3.9/4.0' = 98%. RQD = 3.9/3.9' = 100%. CLAYSTONE: same as above; moist.	
			<u>56.5-60.5' SAMPLE.</u> Recovered 3.8/4.0' = 95%. RQD = 1.3/3.8' = 34%. CLAYSTONE: dark gray (N 3/0) to grayish black (N 2/0); dense; homogenous; some carbonaceous debris; moist to wet.	

LOG
OF
BOREHOLE

Location Rocky Flats Plant; Mound Area
Coordinates N 36934.99 E 22715.72
Total Depth 110.40'

Borehole/Well No. 22-87BR
Ground Surface Elevation 5930.70'
Water Level Encountered 12.2'
Static 5852.04' (12/01/87)

Drilling Company Boyles Bros
Date Drilled Sept 30 & Oct 7-8, 1987
Drilling Method Hollow Stem Auger; Rotary Core
Logged By K.D. Holliway; J.B. Beraman
Geologist

Driller R. Sharp
Helper T. Merritt
Drilling Fluid 0.0 - 45.1' None;
45.1' - 110.4' Water
Checked By JTB
Site Manager

CEARP Manager

Comments Surface casing set to 43.59' by K.D. Holliway on October 2, 1987

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			<u>60.5-64.5' SAMPLE.</u> Recovered 3.6/4.0' = 90%. RQD = 3.6/3.6' = 100%. CLAYSTONE: dark gray (N 3/0); dense; consolidated; homogenous; some carbona- ceous debris; sandy from 60.9-61.4'; moist to wet.	
			<u>64.5-68.5' SAMPLE.</u> Recovered 3.3/4.0' = 83%. RQD = 2.1/3.3' = 64%. 64.5-66.6': CLAYSTONE: same as above. 66.6-67.8': MUDSTONE: brownish gray (5 YR 4/1); very fine-grained; "sulphur-like" smell when HCl is added; abundant car- bonaceous fragments; fragments strongly react with HCl; cement only slightly re- acts when powdered; very hard and dense; dry.	
			<u>68.5-72.5' SAMPLE.</u> Recovered 4.0/4.0' = 100%. RQD = 3.7/4.0' = 93%. CLAYSTONE: brownish black (5 YR 2/1); trace very fine-grained sand; abundant organic fragments; moist to wet.	
			<u>72.5-76.5' SAMPLE.</u> Recovered 3.7/4.0' = 93%. RQD = 3.7/3.7' = 100%. CLAYSTONE: same as above; no sand; fractures at 76.0' and 76.3' (~45°); moist to wet.	

LOG OF BOREHOLE

Location Rocky Flats Plant; Mound Area
Coordinates N 36934.99 E 22715.72
Total Depth 110.40'

Borehole/Well No. 22-87BR
Ground Surface Elevation 5930.70'
Water Level Encountered 12.2'
Static 5852.04' (12/01/87)

Drilling Company Boyles Bros
Date Drilled Sept 30 & Oct 7-8, 1987
Drilling Method Hollow Stem Auger; Rotary Core
Logged By K.D. Holliway; J.B. Beroman
Geologist

Driller R. Sharp
Helper T. Merritt
Drilling Fluid 0.0 - 45.1' None;
45.1' - 110.4' Water
Checked By [Signature]
Site Manager

CEARP Manager

Comments Surface casing set to 43.59' by K.D. Holliway on October 2, 1987

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			<u>76.5-80.5' SAMPLE.</u> Recovered 4.0/4.0' = 100%. RQD = 3.6/4.0' = 90%. CLAYSTONE: same as above.	
			TOTAL DEPTH OF HOLE: 78.50'; AD- JUST DEPTH.	
			<u>78.5-82.5' SAMPLE.</u> Recovered 3.7/4.0' = 93%. RQD = 3.7/3.7' = 100%. 78.5-81.5': CLAYSTONE: same as above. 81.5-82.5': SANDSTONE: medium gray (N 5/0); well sorted; fine to very fine- grained; rounded; some silt; some organ- ics; consolidated; homogenous; moist.	
			<u>82.5-86.5' SAMPLE.</u> Recovered 4.0/4.0' = 100%. RQD = 3.0/4.0' = 75%. SANDSTONE: medium gray (N 5/0); fine to medium-grained; rounded; well sorted; consolidated; calcareous cementation from 86.3-86.5'-strongly reacts with HCl; some clay layers <1" thick present throughout; wet to moist.	

LOG OF BOREHOLE

Location Rocky Flats Plant; Mound Area
Coordinates N 36934.99 E 22715.72
Total Depth 110.40'

Borehole/Well No. 22-87BR
Ground Surface Elevation 5930.70'
Water Level Encountered 12.2'
Static 5852.04' (12/01/87)

Drilling Company Boyles Bros
Date Drilled Sept 30 & Oct 7-8, 1987
Drilling Method Hollow Stem Auger; Rotary Core
Logged By K.D. Holliway; J.B. Berqman
Geologist

Driller R. Sharp
Helper T. Merritt
Drilling Fluid 0.0 - 45.1' None;
45.1' - 110.4' Water
Checked By JJP
Site Manager

CEARP Manager

Comments Surface casing set to 43.59' by K.D. Holliway on October 2, 1987

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			<u>86.5-90.5' SAMPLE.</u> Recovered 2.6/4.0' = 65%. RQD = 1.3/2.6' = 50%. 86.5-87.1': SANDSTONE: medium light gray (N 6/0); fine to medium-grained; rounded; well sorted; calcareous cement; very dense and consolidated; dry. 87.1-88.5': INTERBEDDED SANDSTONE AND CLAYSTONE: sandstone layers medium gray (N 5/0); 0.5" to 2" thick; claystone layers medium dark gray (N 4/0); consolidated; moist. 88.5-89.1': CLAYSTONE: medium dark gray (N 4/0) with some very thin (<0.5') sandstone layers; same sand as above; moist.	
			<u>90.5-95.0' SAMPLE.</u> Recovered 4.0/4.5' = 89%. RQD = 3.3/4.0' = 83%. INTERBEDDED SANDSTONE/ CLAYSTONE: medium light gray (N 6/0) sandstone and medium dark gray (N 4/0) claystone; sandstone layers .05 to 1' thick; claystone layers 0.2-0.5' thick; decrease sandstone content with depth; crossbedded sands; moist to wet.	

LOG OF BOREHOLE

Location Rocky Flats Plant; Mound Area
Coordinates N 36934.99 E 22715.72
Total Depth 110.40'

Borehole/Well No. 22-87BR
Ground Surface Elevation 5930.70'
Water Level Encountered 12.2'
Static 5852.04' (12/01/87)

Drilling Company Boyles Bros
Date Drilled Sept 30 & Oct 7-8, 1987
Drilling Method Hollow Stem Auger; Rotary Core
Logged By K.D. Holliway; J.B. Bergman
Geologist

Driller R. Sharp
Helper T. Merritt
Drilling Fluid 0.0 - 45.1' None;
45.1' - 110.4' Water
Checked By JJP
Site Manager

CEARP Manager

Comments Surface casing set to 43.59' by K.D. Holliway on October 2, 1987

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			<u>95.0-99.0' SAMPLE.</u> Recovered 4.0/4.0' = 100%. RQD = 2.8/4.0' = 70%. INTERBEDDED SANDSTONE/ CLAY- STONE: same as above with claystone layer from 97.3-98.7'; moist to wet.	
			<u>99.0-103.0' SAMPLE.</u> Recovered 2.0/4.0' = 50%. RQD = 1.3/2.0' = 65%. INTERBEDDED SANDSTONE/ CLAY- STONE: same as above with less sand content; layers are not distinct gradual changes; moist to wet.	
			<u>102.0-107.0' SAMPLE.</u> Recovered 5.0/5.0' = 100%. RQD = 5.0/5.0' = 100%. CLAYSTONE: medium dark gray (N 4/0); trace silt; trace carbonaceous fragments; homogenous; consolidated; dense; moist (picked up one foot of core from last run).	
			<u>107.0-111.0' SAMPLE.</u> Recovered 2.0/4.0' = 50%. RQD = 0.0/2.0' = 0%. CLAYSTONE: same as above; very bro- ken; moist.	
			TOTAL DEPTH: 110.40'	

WELL COMPLETION INFORMATION

Location Rocky Flats Plant; Mound Area

Coordinates N 36934.99 E 22715.72

Total Depth: Well 88.70'

Borehole 110.40'

Well No. 22-87BR

Elevation: Ground Surface 5930.70'

Top of Casing 5932.49'

Formation of Completion Arapahoe Formation

Casing Material Sch 5, type 316 TFJ stainless steel

Screen Material 0.010" wire wrap, type 316 TFJ stainless steel

Date Installed Oct. 10, 1987

Installed By K. D. Holliway
Geologist

Casing Diameter 2" ID

Surface Casing Diameter 5" ID

Approved By

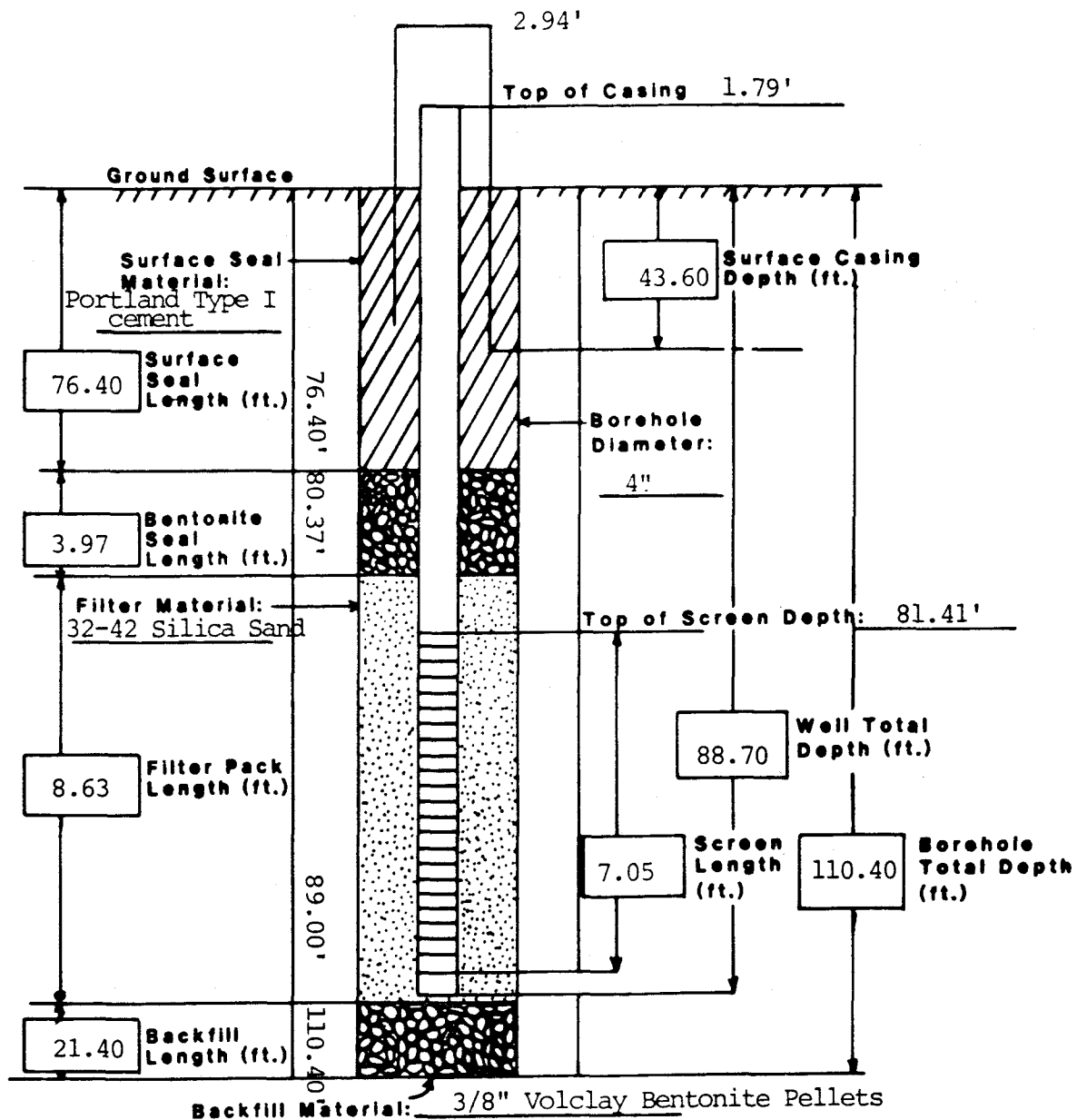
J. Pasella

Site Manager

Brent Lewis

CEAPP Manager

Comments Surface casing set to 43.60' by K. D. Holliway October 9, 1987



PACKER TEST ANALYSIS

WELL NO. 22-87BR

ROCKY FLATS PLANT; MOUND AREA

JOB NO. 2029-17-02

DATE TESTED: 10/12/87

BY: K.D. HOLLIWAY

TEST INTERVAL (FEET BELOW G.S.): 45.60 - 52.55

MATERIAL TESTED: ARAPAHOE CLAYSTONE

DEPTH TO WATER (FEET BELOW G.S.): 78.66

$$K = \frac{Q}{2(\pi)(L)(H)} \ln\left(\frac{L}{R}\right)$$

1ST P1/3 TEST

Q = INJECTION RATE = .00008688 (FEET³/MIN)

L = LENGTH OF TEST INTERVAL = 6.95 FEET

TEST INTERVAL IS ABOVE WATER TABLE

HEAD = DEPTH OF CENTER OF INTERVAL + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)

= 49.07 + 11.15 + .00 * 2.31 = 60.22

R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .0000001233 FT/MIN

K = .00000006 CM/SEC

P2/3 TEST

Q = INJECTION RATE = .00021721 (FEET³/MIN)

L = LENGTH OF TEST INTERVAL = 6.95 FEET

TEST INTERVAL IS ABOVE WATER TABLE

HEAD = DEPTH OF CENTER OF INTERVAL + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)

= 49.07 + 6.70 + 8.00 * 2.31 = 74.25

R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .0000002500 FT/MIN

K = .00000013 CM/SEC

2ND P1/3 TEST

PACKER TEST ANALYSIS

WELL NO. 22-87BR

ROCKY FLATS PLANT; MOUND AREA

JOB NO. 2029-17-02

DATE TESTED: 10/12/87

BY: K.D. HOLLIWAY

TEST INTERVAL (FEET BELOW G.S.): 52.55 - 62.20

MATERIAL TESTED: ARAPAHOE CLAYSTONE

DEPTH TO WATER (FEET BELOW G.S.): 78.66

$$K = \frac{Q}{2(PI)(L)(H)} \ln\left(\frac{L}{R}\right)$$

1ST P1/3 TEST

Q = INJECTION RATE = .00007240 (FEET3/MIN)

L = LENGTH OF TEST INTERVAL = 9.65 FEET

TEST INTERVAL IS ABOVE WATER TABLE

HEAD = DEPTH OF CENTER OF INTERVAL + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)

= 57.38 + 12.05 + .00 * 2.31 = 69.43

R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .0000000698 FT/MIN

K = .00000004 CM/SEC

P2/3 TEST

Q = INJECTION RATE = .00017377 (FEET3/MIN)

L = LENGTH OF TEST INTERVAL = 9.65 FEET

TEST INTERVAL IS ABOVE WATER TABLE

HEAD = DEPTH OF CENTER OF INTERVAL + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)

= 57.38 + 6.70 + 9.50 * 2.31 = 86.02

R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .0000001353 FT/MIN

K = .00000007 CM/SEC

2ND P1/3 TEST

PACKER TEST ANALYSIS

WELL NO. 22-87BR

ROCKY FLATS PLANT; MOUND AREA

JOB NO. 2029-17-02

DATE TESTED: 10/12/87

BY: K.D. HOLLIWAY

TEST INTERVAL (FEET BELOW G.S.): 62.20 - 71.85

MATERIAL TESTED: ARAPAHOE CLAYSTONE

DEPTH TO WATER (FEET BELOW G.S.): 78.66

$$K = \frac{Q}{2(\pi)(L)(H)} \ln\left(\frac{L}{R}\right)$$

1ST P1/3 TEST

Q = INJECTION RATE = .00001448 (FEET³/MIN)

L = LENGTH OF TEST INTERVAL = 9.65 FEET

TEST INTERVAL IS ABOVE WATER TABLE

HEAD = DEPTH OF CENTER OF INTERVAL + GAGE HEIGHT

+ GAGE PRESSURE (IN FEET)

= 67.03 + 11.61 + .00 * 2.31 = 78.64

R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .0000000123 FT/MIN

K = .00000001 CM/SEC

P2/3 TEST

PACKER TEST ANALYSIS

WELL NO. 22-87BR

ROCKY FLATS PLANT; MOUND AREA

JOB NO. 2029-17-02

DATE TESTED: 10/09/87

BY: J.B. BERGMAN

TEST INTERVAL (FEET BELOW G.S.): 71.85 - 81.50

MATERIAL TESTED: ARAPAHOE CLAYSTONE

DEPTH TO WATER (FEET BELOW G.S.): 78.66

$$K = \frac{Q}{2(\pi)(L)(H)} \ln\left(\frac{L}{R}\right)$$

1ST P1/3 TEST

Q = INJECTION RATE = .00004344 (FEET³/MIN)

L = LENGTH OF TEST INTERVAL = 9.65 FEET

TEST INTERVAL IS ABOVE WATER TABLE

HEAD = DEPTH OF CENTER OF INTERVAL + GAGE HEIGHT

+ GAGE PRESSURE (IN FEET)

= 76.68 + 11.88 + .00 * 2.31 = 88.56

R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .0000000328 FT/MIN

K = .00000002 CM/SEC

P2/3 TEST

Q = INJECTION RATE = .00021721 (FEET³/MIN)

L = LENGTH OF TEST INTERVAL = 9.65 FEET

TEST INTERVAL IS ABOVE WATER TABLE

HEAD = DEPTH OF CENTER OF INTERVAL + GAGE HEIGHT

+ GAGE PRESSURE (IN FEET)

= 76.68 + 7.50 + 13.50 * 2.31 = 115.36

R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .0000001261 FT/MIN

K = .00000006 CM/SEC

2ND P1/3 TEST

PACKER TEST ANALYSIS
WELL NO. 22-87BR
ROCKY FLATS PLANT; MOUND AREA JOB NO. 2029-17-02
DATE TESTED: 10/09/87 BY: J.B. BERGMAN
TEST INTERVAL (FEET BELOW G.S.): 81.50 - 91.15
MATERIAL TESTED: ARAPAHOE SANDSTONE
DEPTH TO WATER (FEET BELOW G.S.): 78.66

$$K = \frac{Q}{2(\pi)(L)(H)} \ln\left(\frac{L}{R}\right)$$

1ST P1/3 TEST

Q = INJECTION RATE = .00386629 (FEET³/MIN)
L = LENGTH OF TEST INTERVAL = 9.65 FEET
TEST INTERVAL IS BELOW WATER TABLE
HEAD = DEPTH TO WATER + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)
= 78.66 + 11.12 + .00 * 2.31 = 89.78
R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .00000288 FT/MIN
K = .00000146 CM/SEC

P2/3 TEST

Q = INJECTION RATE = .00641485 (FEET³/MIN)
L = LENGTH OF TEST INTERVAL = 9.65 FEET
TEST INTERVAL IS BELOW WATER TABLE
HEAD = DEPTH TO WATER + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)
= 78.66 + 7.50 + 16.05 * 2.31 = 123.24
R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .00000349 FT/MIN
K = .00000177 CM/SEC

2ND P1/3 TEST

Q = INJECTION RATE = .00275129 (FEET³/MIN)
L = LENGTH OF TEST INTERVAL = 9.65 FEET
TEST INTERVAL IS BELOW WATER TABLE
HEAD = DEPTH TO WATER + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)
= 78.66 + 9.44 + .00 * 2.31 = 88.10
R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .00000209 FT/MIN
K = .00000106 CM/SEC

PACKER TEST ANALYSIS
WELL NO. 22-87BR
ROCKY FLATS PLANT; MOUND AREA JOB NO. 2029-17-02
DATE TESTED: 10/09/87 BY: J.B. BERGMAN
TEST INTERVAL (FEET BELOW G.S.): 82.70 - 92.35
MATERIAL TESTED: ARAPAHOE SANDSTONE
DEPTH TO WATER (FEET BELOW G.S.): 78.66

$$K = \frac{Q}{2(\pi)(L)(H)} \ln\left(\frac{L}{R}\right)$$

1ST P1/3 TEST

Q = INJECTION RATE = .00424278 (FEET3/MIN)
L = LENGTH OF TEST INTERVAL = 9.65 FEET
TEST INTERVAL IS BELOW WATER TABLE
HEAD = DEPTH TO WATER + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)
= 78.66 + 9.62 + .00 * 2.31 = 88.28
R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .00000322 FT/MIN
K = .00000163 CM/SEC

P2/3 TEST

Q = INJECTION RATE = .00561843 (FEET3/MIN)
L = LENGTH OF TEST INTERVAL = 9.65 FEET
TEST INTERVAL IS BELOW WATER TABLE
HEAD = DEPTH TO WATER + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)
= 78.66 + 7.50 + 16.50 * 2.31 = 124.28
R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .00000303 FT/MIN
K = .00000154 CM/SEC

2ND P1/3 TEST

Q = INJECTION RATE = .00370700 (FEET3/MIN)
L = LENGTH OF TEST INTERVAL = 9.65 FEET
TEST INTERVAL IS BELOW WATER TABLE
HEAD = DEPTH TO WATER + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)
= 78.66 + 10.45 + .00 * 2.31 = 89.11
R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .00000279 FT/MIN
K = .00000141 CM/SEC

PACKER TEST ANALYSIS

WELL NO. 22-87BR

ROCKY FLATS PLANT; MOUND AREA

JOB NO. 2029-17-02

DATE TESTED: 10/09/87

BY: J.B. BERGMAN

TEST INTERVAL (FEET BELOW G.S.): 92.35 - 102.00

MATERIAL TESTED: ARAPAHOE SANDSTONE

DEPTH TO WATER (FEET BELOW G.S.): 78.66

$$K = \frac{Q}{2(\pi)(L)(H)} \ln\left(\frac{L}{R}\right)$$

1ST P1/3 TEST

Q = INJECTION RATE = .00127428 (FEET3/MIN)

L = LENGTH OF TEST INTERVAL = 9.65 FEET

TEST INTERVAL IS BELOW WATER TABLE

HEAD = DEPTH TO WATER + GAGE HEIGHT

+ GAGE PRESSURE (IN FEET)

= 78.66 + 10.95 + .00 * 2.31 = 89.61

R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .00000095 FT/MIN

K = .00000048 CM/SEC

P2/3 TEST

Q = INJECTION RATE = .00240376 (FEET3/MIN)

L = LENGTH OF TEST INTERVAL = 9.65 FEET

TEST INTERVAL IS BELOW WATER TABLE

HEAD = DEPTH TO WATER + GAGE HEIGHT

+ GAGE PRESSURE (IN FEET)

= 78.66 + 7.50 + 18.50 * 2.31 = 128.90

R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .00000125 FT/MIN

K = .00000063 CM/SEC

2ND P1/3 TEST

Q = INJECTION RATE = .00085435 (FEET3/MIN)

L = LENGTH OF TEST INTERVAL = 9.65 FEET

TEST INTERVAL IS BELOW WATER TABLE

HEAD = DEPTH TO WATER + GAGE HEIGHT

+ GAGE PRESSURE (IN FEET)

= 78.66 + 10.20 + .00 * 2.31 = 88.86

R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .00000064 FT/MIN

K = .00000033 CM/SEC

PACKER TEST DATA SHEET

Job No.: 2029-17-02
 Location: Rocky Flats Plant; Mound Area
 Well No.: 22-87BR
 Borehole Diameter: 0.333'
 Acrylic Tube Diameter: 0.1663'
 Static Water Level: 78.66'
 Date of Water Level: 12/1/87
 Page 1 of 2
 Comments: Test interval #5 failed on 2/3 pressure test and second 1/3 pressure test due to water gain in acrylic tube and test intervals #6 and 7 failed on second 1/3 pressure test.

Test Interval No.	Top of Test Interval	Bottom of Test Interval	Test Length (minutes)	Gage Pressure	Gage Height	Avg. H ₂ O Height	Gage Height + Avg. H ₂ O Height	Δh	Date of Test	Lithology	Geologist
1	92.35	102.00	15	0	7.50	3.45	10.95	0.88	10/09/87	Kass	JBB
			15	18.5	7.50	N/A	7.50	1.66	10/09/87	Kass	JBB
			15	0	7.50	2.70	10.20	0.59	10/09/87	Kass	JBB
2	82.70	92.35	15	0	7.50	2.12	9.62	2.93	10/09/87	Kass	JBB
			15	16.5	7.50	N/A	7.50	3.88	10/09/87	Kass	JBB
			15	0	7.50	2.95	10.45	2.56	10/09/87	Kass	JBB
3	81.50	91.15	15	0	7.50	3.62	11.12	2.67	10/09/87	Kass	JBB
			15	16.05	7.50	N/A	7.50	4.43	10/09/87	Kass	JBB
			15	0	7.50	1.94	9.44	1.90	10/09/87	Kass	JBB
4	71.85	81.50	15	0	7.50	4.38	11.88	0.03	10/09/87	KCL	JBB
			15	13.5	7.50	N/A	7.50	0.15	10/09/87	KCL	JBB
			15	0	7.50	5.37	12.87	0.00	10/09/87	KCL	JBB
5	62.20	71.85	15	0	6.70	4.91	11.61	0.01	10/12/87	KCL	KDH
			15	11.8	6.70	N/A	6.70	-0.03	10/12/87	KCL	KDH
			15	0	6.70	4.41	11.11	-0.37	10/12/87	KCL	KDH
6	52.55	62.20	15	0	6.70	5.35	12.05	0.05	10/12/87	KCL	KDH
			15	9.5	6.70	N/A	6.70	0.12	10/12/87	KCL	KDH
			15	0	6.70	1.52	8.22	-0.11	10/12/87	KCL	KDH

12/11/87

Water Level Data
for
Rockwell (Rocky Flats)

<u>Date Measured</u>	<u>Depth to Water from TOC</u>	<u>Elevation TOC (ft)</u>	<u>Water Level Elev. (ft)</u>
--------------------------	------------------------------------	-------------------------------	-----------------------------------

** Well Number: 2287BR

12/01/87	80.45	5932.49	5852.04
----------	-------	---------	---------

INDEX OF DATA

Boring No.: 23-87BR

Completed as well? Yes

Data in File

- ☒ Log of Borehole
- ☒ Well Construction Summaries
- ☐ Well Development Summaries
- ☒ Hydraulic Conductivity Test Data
and Results
- ☐ Packer Test Data and Results
- ☒ Water Level Data

LOG OF BOREHOLE

Location Rocky Flats Plant; Mound Area
Coordinates N 36415.15 E 22802.78
Total Depth 45.30'

Borehole/Well No. 23-87BR
Ground Surface Elevation 5972.34'
Water Level Encountered 19.0'
Static 5958.39' (12/01/87)

Drilling Company Boyles Bros
Date Drilled July 17-21, 1987
Drilling Method Hollow Stem Auger
Logged By S. Rogal; K.D. Hollaway
Geologist

Driller D. Jarvie
Helper J. Duncan
Drilling Fluid None
Checked By [Signature]
Site Manager
CEARP Manager

Comments _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
0			ROCKY FLATS ALLUVIUM	
			<u>0.0-2.0' SAMPLE.</u> Recovered 1.5/2.0' = 75%. 0-1.0': SAND: dusky brown (5 YR 2/2); fine-grained; some grass; dry. 1.0-1.5': SILTY SAND: dusky yellow (5 Y 6/4); some gravel; dry.	HNu Background=2.0 OVA Background=3.0 Ludlum Background = 0.0 0-2.0': No readings over background on core.
5			<u>2.0-4.0' SAMPLE.</u> Recovered 1.4/2.0' = 70%. SAND: dusky yellow (5 Y 6/4); fine- grained; some gravel and cobbles; iron discoloration; dry.	2.0-4.0': Readings on core: HNu = 3.0; OVA = 5.0.
10			<u>4.0-5.0' SAMPLE.</u> Recovered 0.9/1.0' = 90%. GRAVEL AND SAND: same as above; dry.	4.0-5.0': Readings on core: HNu = 5.0; OVA = 7.0.
			<u>5.0-7.0' SAMPLE.</u> Recovered 0.4/2.0' = 20%. GRAVEL AND SAND: light olive brown (5 Y 5/6); trace silt; dry.	5.0-7.0': Readings on core: HNu = 5.0; OVA = 6.0.
15			<u>7.0-9.0' SAMPLE.</u> Recovered 1.7/2.0' = 85%. GRAVEL AND SAND: same as above; dry.	7.0-9.0': Readings on core: HNu = 2.0; OVA = 5.0.
			<u>9.0-11.0' SAMPLE.</u> Recovered 0.6/2.0' = 30%. GRAVEL AND SAND: same as above; dry.	9.0-11.0': No readings over background on core.
20				

LOG OF BOREHOLE

Location Rocky Flats Plant; Mound Area
Coordinates N 36415.15 E 22802.78
Total Depth 45.30'

Borehole/Well No. 23-87BR
Ground Surface Elevation 5972.34'
Water Level Encountered 19.0'
Static 5958.39' (12/01/87)

Drilling Company Boyles Bros
Date Drilled July 17-21, 1987
Drilling Method Hollow Stem Auger
Logged By S. Rogal; K.D. Holliday
Geologist

Driller D. Jarvie
Helper J. Duncan
Drilling Fluid None
Checked By [Signature]
Site Manager

CEARP Manager

Comments

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
20			<u>11.0-13.0' SAMPLE.</u> Recovered 0.43/2.0=20%. GRAVEL AND SILT: moderate reddish brown (10 R 4/6); trace fine-grained sand; cobble stuck in shoe of barrel; damp.	<u>11.0-13.0':</u> Readings on core: HNu = 5.0; OVA = 4.0.
25			<u>13.0-15.0' SAMPLE.</u> Recovered 1.7/2.0' = 85%. GRAVEL AND SILT: same as above with iron and limonite staining; damp.	<u>13.0-15.0':</u> Readings on core: HNu = 3.0; OVA = 5.0.
			<u>15.0-17.0' SAMPLE.</u> Recovered 1.98/2.0' = 99%. 15.0-15.25': GRAVEL AND SILT: same as above; damp.	<u>15.0-17.0':</u> Readings on core: HNu = 2.0; OVA = 5.0.
30			<u>ARAPAHOE FORMATION</u> 15.25-17.0': SANDSTONE: dusky yellow (5 Y 6/4); fine-grained; well sorted; iron staining; weathered; damp.	<u>17.0-19.0':</u> Readings on core: HNu = 5.0; OVA = 5.0.
			<u>17.0-19.0' SAMPLE.</u> Recovered 2.0/2.0' = 100%. SANDSTONE: same as above; moist.	<u>19.0-21.0':</u> Readings on core: HNu = 3.0; OVA = 5.0.
35			<u>19.0-21.0' SAMPLE.</u> Recovered 2.0/2.0' = 100%. SANDSTONE: same as above; wet.	<u>21.0-23.0':</u> Readings on core: HNu = 3.0; OVA = 5.0.
			<u>21.0-23.0' SAMPLE.</u> Recovered 2.0/2.0' = 100%. SANDSTONE: same as above; moist.	<u>23.0-25.0':</u> Readings on core: HNu = 3.0; OVA = 5.0.
40				<u>25.0-27.0':</u> Readings on core: HNu = 3.0; OVA = 5.0.

LOG OF BOREHOLE

Location Rocky Flats Plant: Mound Area
Coordinates N 36415.15 E 22802.78
Total Depth 45.30'

Borehole/Well No. 23-87BR
Ground Surface Elevation 5972.34'
Water Level Encountered 19.0'
Static 5958.39' (12/01/87)

Drilling Company Boyles Bros
Date Drilled July 17-21, 1987
Drilling Method Hollow Stem Auger
Logged By S. Rogal; K.D. Holliway
Geologist

Driller D. Jarvie
Helper J. Duncan
Drilling Fluid None
Checked By J. Paschal
Site Manager

CEARP Manager

Comments

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
40			<p><u>23.0-25.0' SAMPLE.</u> Recovered 2.0/2.0' = 100%. SANDSTONE: olive gray (5 Y 3/2); mottled; weathered; wet.</p> <p><u>25.0-27.0' SAMPLE.</u> Recovered 2.0/2.0' = 100%. SANDSTONE: same as above; wet at 25.6'.</p> <p><u>27.0-29.0' SAMPLE.</u> Recovered 1.9/2.0' = 100%. SANDSTONE: same as above; wet.</p> <p><u>29.0-31.0' SAMPLE.</u> Recovered 2.0/2.0' = 100%. SANDSTONE: olive gray (5 Y 3/2); trace silt; mottled; weathered; from 29.0-30.3' damp; 30.3-31' wet.</p> <p><u>31.0-33.0' SAMPLE.</u> Recovered 2.0/2.0' = 100%. SANDSTONE: same as above with 1/2" gray clay lenses at 31.8', 32.3', 32.8'; moist.</p> <p><u>31.4-33.4' SAMPLE.</u> Recovered 2.0/2.0' = 100%. SANDSTONE: dark yellowish orange (10 YR 6/6) to dusky yellow (5 Y 6/4); 3.5-4.0 phi sand, well sorted; interbedded sand, light olive gray (5 Y 6/1), 3.0-2.5 phi; fairly well sorted; wet to moist.</p> <p><u>33.4-35.0' SAMPLE.</u> No recovery. Drilled with center bit.</p>	<p><u>27.0-29.0':</u> Readings on core: HNu = 3.0; OVA = 5.0.</p> <p><u>29.0-31.0':</u> Readings on core: HNu = 3.0; OVA = 5.0.</p> <p><u>31.0-33.0':</u> Readings on core: HNu = 3.0; OVA = 5.0.</p>
45				
50				

LOG OF BOREHOLE

Location Rocky Flats Plant; Mound Area

Coordinates N 36415.15 E 22802.78

Total Depth 45.30'

Drilling Company Boyles Bros

Date Drilled July 17-21, 1987

Drilling Method Hollow Stem Auger

Logged By S. Rogal; K.D. Holliway
Geologist

Borehole/Well No. 23-87BR

Ground Surface Elevation 5972.34'

Water Level Encountered 19.0'

Static 5958.39' (12/01/87)

Driller D. Jarvie

Helper J. Duncan

Drilling Fluid None

Checked By [Signature]
Site Manager

CEARP Manager

Comments _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			<u>35.0-36.0' SAMPLE.</u> Recovered 1.0/1.0' = 100%. SANDSTONE: dark yellowish orange (10 YR 6/6) to dusky yellow (5 Y 6/4); sand 3.5-4.0 phi, well sorted; trace clay; wet.	
			<u>36.0-37.0' SAMPLE.</u> Recovered 1.0/1.0' = 100%. SANDSTONE: same as above; wet.	
			<u>37.0-38.0' SAMPLE.</u> Recovered 1.0/1.0' = 100%. CLAYEY SANDSTONE: olive gray (5 Y 4/1); sand 3.5-4.0 phi; some silt; some clay; unweathered; moist.	
			<u>38.0-39.3' SAMPLE.</u> Recovered 1.3/1.3' = 100%. CLAYEY SANDSTONE: same as above; moist.	
			<u>39.3-40.3' SAMPLE.</u> Recovered 1.0/1.0' = 100%. SILTSTONE: olive gray (5 Y 4/1) to olive gray (5 Y 3/2); some clay; some 3.5-4.0 phi sand; unweathered; moist.	
			<u>40.3-41.3' SAMPLE.</u> Recovered 1.0/1.0' = 100%. 40.3-40.8': CLAYSTONE: olive gray (5 Y 4/1) trace silt; trace 3.5-4.0 phi sand; unweathered; slightly moist to damp. 40.8-41.3': SILTSTONE: olive gray (5 Y 4/1); some very fine-grained sand; some clay; unweathered; damp to dry.	

LOG
OF
BOREHOLE

Location Rocky Flats Plant; Mound Area
Coordinates N 36415.15 E 22802.78
Total Depth 45.30'

Borehole/Well No. 23-87BR
Ground Surface Elevation 5972.34'
Water Level Encountered 19.0'
Static 5958.39' (12/01/87)

Drilling Company Boyles Bros
Date Drilled July 17-21, 1987
Drilling Method Hollow Stem Auger
Logged By S. Rogal; K.D. Holliway
Geologist

Driller D. Jarvie
Helper J. Duncan
Drilling Fluid None
Checked By J. P. Pantoja
Site Manager

CEARP Manager

Comments _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			<u>41.3-42.3' SAMPLE.</u> Recovered 0/1.0' = 0%. SILTSTONE: same as above; dry.	
			<u>42.3-43.3' SAMPLE.</u> Recovered 1.0/1.0' = 100%. SILTSTONE: same as above; trace very fine-grained sand; dry.	
			<u>43.3-44.3' SAMPLE.</u> Recovered 1.0/1.0' = 100%. SILTSTONE: same as above; dry.	
			<u>44.3-45.3' SAMPLE.</u> Recovered 1.0/1.0' = 100%. SILTSTONE: same as above except more sand; dry.	
			TOTAL DEPTH: 45.30'	

WELL COMPLETION INFORMATION

Location Rocky Flats Plant; Mound Area

Coordinates N 36415.15 E 22802.78

Total Depth: Well 37.85'

Borehole 45.30'

Formation of Completion Arapahoe Formation

Casing Material Sch 5, type 316 TFJ stainless steel

Screen Material 0.010" wire wrap, type 316 TFJ stainless steel

Date Installed July 24, 1987

Installed By K.D. Holliday
Geologist

Well No. 23-87BR

Elevation: Ground Surface 5972.34'

Top of Casing 5974.49'

Casing Diameter 2" ID

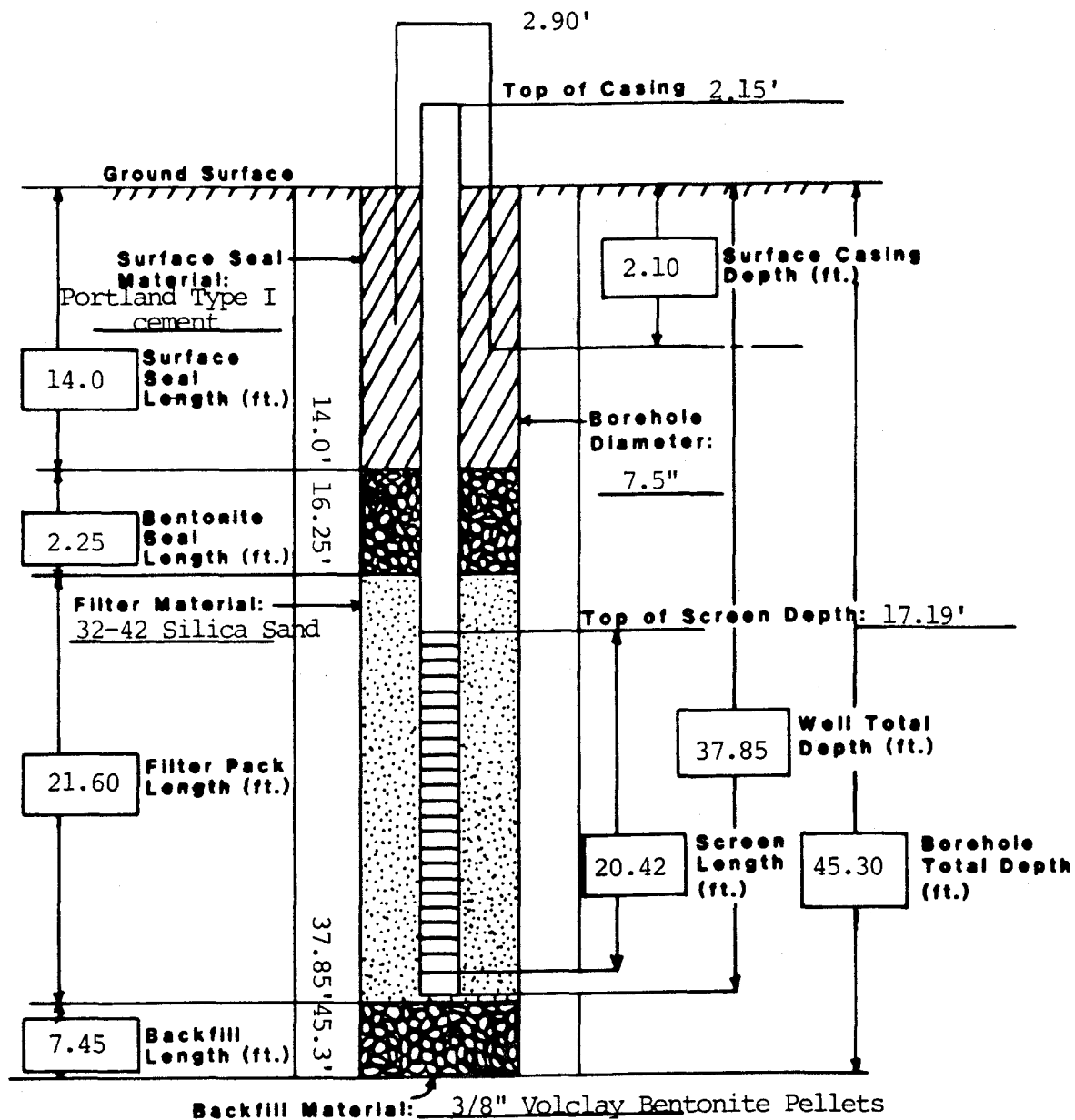
Surface Casing Diameter 5" ID

Approved By [Signature]

Site Manager

CEARP Manager

Comments _____



PROGRAM SLUGT, VERSION 4.OCT. 1985

THIS PROGRAM CALCULATES MEAN TRANSMISSIVITIES FROM SLUG-TEST DATA BASED ON TWO ANALYTICAL APPROACHES:

- (1) METHOD OF COOPER, BREDEHOEFT AND PAPADOPULOS, 1967 (ARTICLE IN VOL.3, NO.1 OF WRR ENTITLED "RESPONSE OF A FINITE DIAMETER WELL TO AN INSTANTANEOUS CHARGE OF WATER")
- (2) METHOD OF BOWMER AND RICE, 1976 (ARTICLE IN VOL. 12, NO.3 OF WRR ENTITLED "A SLUG TEST FOR DETERMINING HYDRAULIC CONDUCTIVITY OF UNCONFINED AQUIFERS WITH COMPLETELY OR PARTIALLY PENETRATING WELLS")

PROJECT NO.: 6-011B-87

CLIENT: Rockwell International

ITE LOCATION: Rocky Flats Plant

DATE OF SLUG TEST: 10-14-87

FIELD INVESTIGATOR: Kevin McNeill

WELL NO.: 23-87 BR

INPUT DATA ARE:

INNER CASING DIAMETER = 2.00 INCHES

LENGTH OF SCREEN OR INTAKE PORTION = 21.13 FEET

INNER SCREEN OR OPEN-HOLE DIAMETER = 2.00 INCHES

DEPTH FROM STATIC LEVEL TO BOTTOM OF SCREEN = 21.13 FEET

DIAMETER OF DRILLED HOLE = 7.50 INCHES

THICKNESS OF SATURATED AQUIFER ZONE = 16.52 FEET

ESTIMATED POROSITY OF GRAVEL PACK = .25

FALLING-HEAD INDEX = 0 (*1* IF FALLING, *0* IF RISING)

NUMBER OF HEAD-TIME DATA POINTS = 54

TIME (sec)	HEAD (FEET)
1.00	1.330
2.00	1.300
3.00	1.290
4.00	1.280
5.00	1.270
6.00	1.260
7.00	1.250
8.00	1.240
9.00	1.230
10.00	1.230
11.00	1.220
12.00	1.210
13.00	1.210
14.00	1.200
17.00	1.180
20.00	1.160
23.00	1.140
26.00	1.130
29.00	1.110
32.00	1.090
35.00	1.080
38.00	1.060
41.00	1.050
44.00	1.050
47.00	1.030
50.00	1.000

53.00	.980
56.00	.970
59.00	.950
62.00	.940
68.00	.910
77.00	.880
86.00	.850
95.00	.810
104.00	.780
113.00	.760
122.00	.730
152.00	.660
182.00	.600
224.00	.530
284.00	.450
344.00	.390
404.00	.330
464.00	.290
524.00	.250
584.00	.220
644.00	.200
704.00	.180
764.00	.160
854.00	.130
974.00	.110
1094.00	.100
1274.00	.080
1577.00	.070

H0 WAS COMPUTED FROM INTERCEPT OF PLOT OF LOG(H) VS. TIME

SUCCESSIVE COMPUTED
VALUES FOR H0
(FEET)

1.1004
1.1322

METHOD OF BOUMER AND RICE

COMPUTED RESULTS USING DIAMETER OF DRILLED HOLE:

PERMEABILITY = $5.76\text{E-}06$ FT/sec = $1.76\text{E-}04$ CM/sec

TRANSMISSIVITY = $9.52\text{E-}05$ FT**2/sec

COMPUTED RESULTS USING DIAMETER OF CASING AND SCREEN:

PERMEABILITY = $1.82\text{E-}06$ FT/sec = $5.54\text{E-}05$ CM/sec

TRANSMISSIVITY = $3.00\text{E-}05$ FT**2/sec

12/11/87

Water Level Data
for
Rockwell (Rocky Flats)

Date
Measured

Depth to Water
from TOC

Elevation
TOC (ft)

Water Level
Elev. (ft)

** Well Number: 2387BR

12/01/87

16.10

5974.49

5958.39

INDEX OF DATA

Boring No.: 24-87

Completed as well? Yes

Data in File

- ☒ Log of Borehole
- ☒ Well Construction Summaries
- ☐ Well Development Summaries
- ☐ Hydraulic Conductivity Test Data
and Results
- ☐ Packer Test Data and Results
- ☒ Water Level Data

LOG OF BOREHOLE

Location Rocky Flats Plant; East Trenches Area
Coordinates N 36759.05 E 23640.05
Total Depth 18.60'

Borehole/Well No. 24-87
Ground Surface Elevation 5957.79'
Water Level Encountered None
Static 5944.74' (12/01/87)

Drilling Company Boyles Bros
Date Drilled September 2, 1987
Drilling Method Hollow Stem Auger
Logged By J.B. Bergman
Geologist

Driller R. Sharp
Helper S. Bradfield
Drilling Fluid None
Checked By J. Pasella
Site Manager
D. J. Davis
CEARP Manager

Comments _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
0			ROCKY FLATS ALLUVIUM	
			<u>0.0-2.0' SAMPLE.</u> Recovered 1.3/2.0' = 65%. CLAY AND GRAVEL: grayish brown (5 YR 3/2); abundant quartzite gravels; angular to subrounded; poorly sorted; roots and grasses common; slightly consolidated; dry.	HNu Background=0.4 OVA Background=0.0 No Ludlum readings taken.
5			<u>2.0-4.0' SAMPLE.</u> Recovered 1.3/2.0' = 65%. SANDY CLAY AND GRAVEL: grayish brown (5 YR 3/2); sandy matrix; some quartzite gravels; some clay; very fine-grained sand; unsorted; angular to subrounded; caliche in shoe at ~3.1'; unconsolidated; slightly damp.	<u>4.0'</u> : Readings at well head: HNu = 0.2; OVA = 6.
10			<u>4.0-6.0' SAMPLE.</u> Recovered 1.0/2.0' = 50%. SANDY CLAY AND GRAVEL: moderate yellowish brown (10 YR 5/4) clay; very fine-grained sand; some clay; some silt; poorly sorted; angular to subrounded; abundant caliche; reacts with HCl; unconsolidated; slightly damp.	<u>7.3'</u> : Readings at well head: HNu = 1.0; OVA = 2.0. Readings in breathing zone: HNu = 0.2; OVA = 6.
15			<u>6.0-7.3' SAMPLE.</u> Recovered 1.3/1.3' = 100%. SANDY CLAY AND GRAVEL: same as above but more clay and less gravel; pebbles in shoe; unconsolidated; slightly damp.	
20				

LOG OF BOREHOLE

Location Rocky Flats Plant; East Trenches Area

Coordinates N 36759.05 E 23640.05

Total Depth 18.60'

Drilling Company Boyles Bros

Date Drilled September 2, 1987

Drilling Method Hollow Stem Auger

Logged By J.B. Bergman
Geologist

Borehole/Well No. 24-87

Ground Surface Elevation 5957.79'

Water Level Encountered None

Static 5944.74' (12/01/87)

Driller R. Sharp

Helper S. Bradfield

Drilling Fluid None

Checked By J. Paschke
Site Manager

CEARP Manager

Comments

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			<u>7.3-9.3' SAMPLE.</u> Recovered 1.2/2.0' = 60%. CLAY AND GRAVEL: moderate brown (5 YR 4/4); abundant quartzite gravels and pebbles; angular to subrounded; trace very fine-grained sand; unconsolidated; slightly damp.	
			<u>9.3-10.1' SAMPLE.</u> Recovered 0.8/0.8' = 100%. CLAY AND GRAVEL: same as above; dry to slightly damp.	
			<u>10.1-11.1':</u> No recovery. Drilled with center bit.	
			<u>11.1-13.1' SAMPLE.</u> Recovered 1.0/2.0' = 50%. CLAY AND GRAVEL: same as above; no caliche; dry to slightly damp.	
			<u>13.1-15.1' SAMPLE.</u> Recovered 2.0/2.0' = 100%. 13.1-13.4': CLAY AND GRAVEL: same as above.	
			<u>ARAPAHOE FORMATION</u>	
			13.4-15.1': CLAYSTONE: light olive gray (5 Y 6/1); abundant dark yellowish orange (10 YR 6/6) mottles; sandy; very fine-grained; silty; rounded; consolidated; weathered; trace caliche; increase in clay with depth; dry.	

LOG OF BOREHOLE

Location Rocky Flats Plant; East Trenches Area

Coordinates N 36759.05 E 23640.05

Total Depth 18.60'

Drilling Company Boyles Bros

Date Drilled September 2, 1987

Drilling Method Hollow Stem Auger

Logged By J.B. Bergman
Geologist

Borehole/Well No. 24-87

Ground Surface Elevation 5957.79'

Water Level Encountered None

Static 5944.74' (12/01/87)

Driller R. Sharp

Helper S. Bradfield

Drilling Fluid None

Checked By [Signature]
Site Manager

CEARP Manager

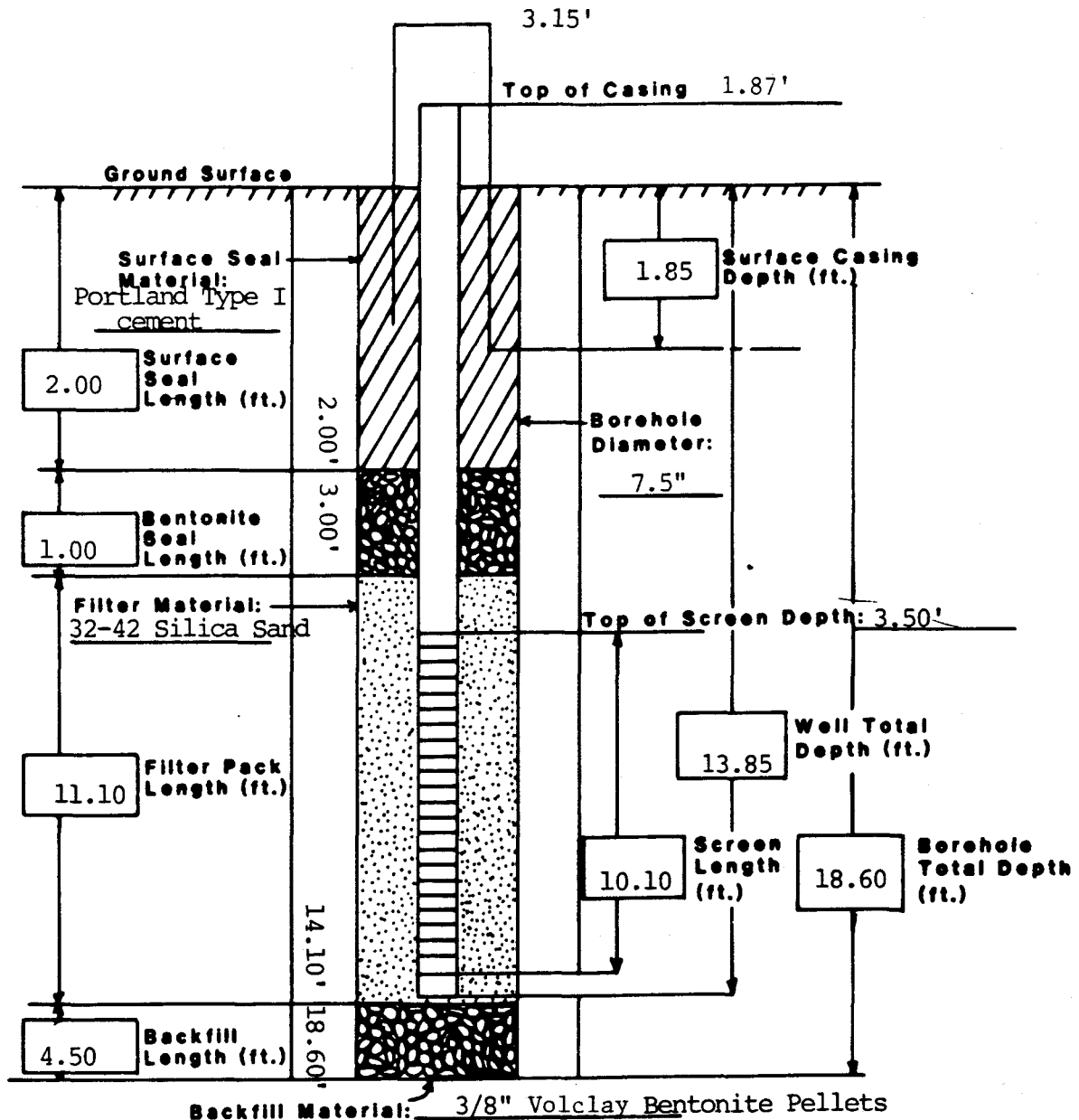
Comments _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			<p><u>15.1-17.1' SAMPLE.</u> Recovered 1.7/2.0' = 85%. CLAYSTONE: same as above.</p> <p><u>17.1-19.1' SAMPLE.</u> Recovered 1.2/2.0' = 60%. SANDY CLAYSTONE: dark yellowish orange (10 YR 6/6) claystone; very fine- grained; consolidated; weathered; abun- dant light brown (5 YR 5/6) nodules in shoe (FeO stains); dry.</p> <p>TOTAL DEPTH WITH PLOPPER = 18.6'. ADJUST DEPTH.</p> <p>TOTAL DEPTH: 18.60'</p>	

WELL
COMPLETION
INFORMATION

Location Rocky Flats Plant; East Trenches Area Well No. 24-87
Coordinates N 36759.05 E 23640.05 Elevation: Ground Surface 5957.79'
Total Depth: Well 13.85' Top of Casing 5959.66'
Borehole 18.60'
Formation of Completion Rocky Flats Alluvium
Casing Material Sch 5, type 316 TFJ stainless steel Casing Diameter 2" ID
Screen Material 0.010" wire wrap, type 316 TFJ stainless steel Surface Casing Diameter 5" ID
Date Installed Sept. 2, 1987 Approved By [Signature] Site Manager
Installed By J. B. Bergman [Signature] CEARP Manager
Geologist

Comments _____



12/11/87

Water Level Data
for
Rockwell (Rocky Flats)

Date
Measured

Depth to Water
from TOC

Elevation
TOC (ft)

Water Level
Elev. (ft)

** Well Number: 2487

12/01/87

14.92

5959.66

5944.74

INDEX OF DATA

Boring No.: 25-87BR

Completed as well? Yes

Data in File

- ☒ Log of Borehole
- ☒ Well Construction Summaries
- ☐ Well Development Summaries
- ☒ Hydraulic Conductivity Test Data
and Results
- ☐ Packer Test Data and Results
- ☒ Water Level Data

LOG
OF
BOREHOLE

Location <u>Rocky Flats Plant; East Trenches Area</u>	Borehole/Well No. <u>25-87BR</u>
Coordinates <u>N 36727.08 E 23641.38</u>	Ground Surface Elevation <u>5958.91'</u>
Total Depth <u>47.00'</u>	Water Level Encountered <u>15.50'</u>
	Static <u>5937.01' (12/01/87)</u>
Drilling Company <u>Boyles Bros.</u>	Driller <u>R. Sharp</u>
Date Drilled <u>August 11-14, 1987</u>	Helper <u>S. Bradfield</u>
Drilling Method <u>Hollow Stem Auger</u>	Drilling Fluid <u>None</u>
Logged By <u>R. T. Treat</u> Geologist	Checked By <u>J. J. Pasolke</u> Site Manager <u>Bert Lewis</u> SEARP Manager

Comments _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
0			<u>TOPSOIL</u> <u>0.0-2.2' SAMPLE.</u> Recovered 1.8/2.2' = 82%. 0.0-0.3': TOP SOIL: dusky brown (5 YR 2/2); clayey quartzite gravels; sandy; slightly damp.	HNu Background=1.0 OVA Background=0.0 No readings over background on core.
5			<u>ROCKY FLATS ALLUVIUM</u> 0.3-1.8': CLAY AND GRAVEL: moderate brown (5 YR 3/4); fine-grained sand; scattered quartzite cobbles; slightly calcareous; dry.	
10			<u>2.2-5.5' SAMPLE.</u> Recovered 1.7/3.3' = 52%. 2.2-2.7': CLAY: grayish brown (5 YR 3/2); slightly sandy with scattered gravel; dry. 2.7-3.9': SAND AND GRAVEL: light brown (5 YR 6/4); angular to subangular gravel; fine-grained sand; dry to slightly damp.	
15			<u>5.5-7.5' SAMPLE.</u> Recovered 2.0/2.0' = 100%. CLAYEY SAND AND GRAVEL: grayish orange pink (5 YR 7/2); quartzite gravels; medium-grained sand; subangular to subrounded; poorly sorted; caliche; dry.	
20				

LOG OF BOREHOLE

Location Rocky Flats Plant; East Trenches Area Borehole/Well No. 25-87BR
 Coordinates N 36727.08 E 23641.38 Ground Surface Elevation 5958.91'
 Total Depth 47.00' Water Level Encountered 15.50'
 Static 5937.01' (12/01/87)
 Drilling Company Boyles Bros Driller R. Sharp
 Date Drilled August 11-14, 1987 Helper S. Bradfield
 Drilling Method Hollow Stem Auger Drilling Fluid None
 Logged By R. T. Treat Checked By J. Pascello
 Geologist Site Manager

CEARP Manager

Comments

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
20			<p><u>7.5-9.5' SAMPLE.</u> Recovered 1.4/2.0' = 70%. CLAYEY SAND AND GRAVEL: light brown (5 YR 6/4) to pale brown (5 YR 5/2); subangular to subrounded gravel; medium-grained sands; poorly sorted; some caliche; scattered subangular to subrounded gravel; dry.</p>	
25			<p><u>9.5-10.5' SAMPLE.</u> Recovered 0.5/1.0' = 50%. CLAYEY SAND: yellowish gray (5 Y 7/2); fine-grained sand; subangular scattered gravels; poorly sorted; dry.</p>	
30			<p><u>10.5-12.5' SAMPLE.</u> Recovered 1.0/2.0' = 50%. SAND AND GRAVEL: grayish brown (5 YR 3/2) to pale brown (5 YR 5/2); clayey; subangular to subrounded gravels; fine to medium-grained sand; poorly sorted; moderately calcareous; slightly damp to moist.</p>	
35			<p><u>12.5-14.5' SAMPLE.</u> Recovered 1.6/2.0' = 80%. SAND AND GRAVEL: same as above; damp.</p>	
40				

LOG OF BOREHOLE

Location Rocky Flats Plant: East Trenches Area Borehole/Well No. 25-87BR
 Coordinates N 36727.08 E 23641.38 Ground Surface Elevation 5958.91'
 Total Depth 47.00' Water Level Encountered 15.50'
 Static 5937.01' (12/01/87)
 Drilling Company Boyles Bros Driller R. Sharp
 Date Drilled August 11-14, 1987 Helper S. Bradfield
 Drilling Method Hollow Stem Auger Drilling Fluid None
 Logged By R. T. Treat Checked By J. J. Pasalle
 Geologist Site Manager
 CEARP Manager

Comments

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
40			<u>14.5-16.5' SAMPLE.</u> Recovered 1.6/2.0' = 80%. 14.5-15.8': SAND AND GRAVEL: pale brown (5 YR 5/2); subangular to sub-rounded gravel; fine to medium-grained sand; poorly sorted; damp. 15.8-16.0': SANDY CLAY: moderate brown (5 YR 3/4); some gravels; medium-grained sands; poorly sorted; damp to moist.	
45			<u>ARAPAHOE FORMATION</u>	
			<u>16.5-18.5' SAMPLE.</u> Recovered 2.0/2.0' = 100%. CLAYEY SANDSTONE: light olive gray (5 Y 5/2); fine-grained sands; FeO staining; calcareous; damp to dry.	
50			<u>18.5-19.5' SAMPLE.</u> Recovered 1.0/1.0' = 100%. CLAYEY SANDSTONE: light olive gray (5 Y 5/2) to dark yellowish orange (10 YR 6/6) in a highly cemented zone at 19.3-19.5'; poorly sorted; damp to dry.	
			<u>19.5-21.0':</u> No recovery. Drilled with center bit.	
			<u>21.0-23.0' SAMPLE.</u> Recovered 2.0/2.0' = 100%. CLAYEY SANDSTONE: grayish orange (10 YR 7/4) to pale yellowish brown (10 YR 6/2); thinly laminated clay beds; fine-grained sand; poorly sorted; slightly cemented; moist.	

LOG OF BOREHOLE

Location Rocky Flats Plant; East Trenches Area Borehole/Well No. 25-87BR
 Coordinates N 36727.08 E 23641.38 Ground Surface Elevation 5958.91'
 Total Depth 47.00' Water Level Encountered 15.50'
 Static _____
 Drilling Company Boyles Bros Driller R. Sharp
 Date Drilled August 11-14, 1987 Helper S. Bradfield
 Drilling Method Hollow Stem Auger Drilling Fluid None
 Logged By R. T. Treat Checked By J. Paschke
 Geologist Site Manager
 CEARP Manager

Comments _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			<u>23.0-24.0' SAMPLE.</u> Recovered 1.0/1.0' = 100%. SANDSTONE: grayish orange (10 YR 7/4); highly weathered; weakly cemented; poorly sorted; wet.	
			<u>24.0-26.0' SAMPLE.</u> No recovery. SANDSTONE: same as above.	
			<u>26.0-28.0' SAMPLE.</u> Recovered 0.8/2.0' = 40%. SANDSTONE: grayish orange (10 YR 7/4); weathered; poorly sorted; weakly cemented; medium-grained; severely oxide stained; wet.	
			<u>28.0-30.0' SAMPLE.</u> Recovered 1.3/2.0' = 65%. SANDSTONE: light bluish gray (5 B 7/1) to grayish orange (10 YR 7/4); massive bedding; weakly cemented; medium-grained; highly weathered; moist.	
			<u>30.0-32.0' SAMPLE.</u> Recovered 0.4/2.0' = 20%. SANDSTONE: same as above; moist.	
			<u>32.0-33.0' SAMPLE.</u> Recovered 1.0/1.0' = 100%. SANDSTONE: dark yellowish orange (10 YR 6/6) to grayish orange (10 YR 7/4); medium-grained sand; subangular to rounded; weakly cemented; poorly sorted; weathered; moist.	

LOG OF BOREHOLE

Location Rocky Flats Plant: East Trenches Area Borehole/Well No. 25-87BR
 Coordinates N 36727.08 E 23641.38 Ground Surface Elevation 5958.91'
 Total Depth 47.00' Water Level Encountered 15.50'
 Static _____
 Drilling Company Boyles Bros Driller R. Sharp
 Date Drilled August 11-14, 1987 Helper S. Bradfield
 Drilling Method Hollow Stem Auger Drilling Fluid None
 Logged By R. T. Treat Checked By [Signature]
 Geologist Site Manager
 CEARP Manager

Comments _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			<u>33.0-35.0' SAMPLE.</u> Recovered 0.5/2.0' = 25%. SANDSTONE: dark yellowish orange (10 YR 6/6); medium-grained sand; sub-rounded; poorly sorted; weakly cemented; moist.	
			<u>35.0-36.0' SAMPLE.</u> Recovered 0.3/1.0' = 30%. SANDSTONE: same as above; moist.	
			<u>36.0-37.5' SAMPLE.</u> No recovery.	
			<u>37.5-38.0' SAMPLE.</u> Recovered 0.2/0.5' = 40%. SANDSTONE: yellowish gray (5 Y 7/2); medium-grained sand; subrounded to sub-angular; weakly cemented; poorly sorted; moist.	
			<u>38.0-39.0' SAMPLE.</u> No recovery. SANDSTONE: same as above.	
			<u>39.0-40.7' SAMPLE.</u> No recovery.	
			<u>40.7-42.7' SAMPLE.</u> Recovered 0.1/2.0' = 5%. SANDSTONE: grayish orange (10 YR 7/4); thin laminated clay; fine-grained sands; poorly sorted; moderately cemented; moist.	

LOG OF BOREHOLE

Location Rocky Flats Plant: East Trenches Area Borehole/Well No. 25-87BR
 Coordinates N 36727.08 E 23641.38 Ground Surface Elevation 5958.91'
 Total Depth 47.00' Water Level Encountered 15.50'
 Static _____
 Drilling Company Boyles Bros Driller R. Sharp
 Date Drilled August 11-14, 1987 Helper S. Bradfield
 Drilling Method Hollow Stem Auger Drilling Fluid None
 Logged By R. T. Treat Checked By J. J. Pascello
 Geologist Site Manager
 CEARP Manager

Comments _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			<u>42.7-44.7' SAMPLE.</u> Recovered 0.5/2.0' = 25%. 42.7-43.2': SANDSTONE: same as above. 43.2-44.7': SANDY CLAYSTONE: yellow- ish gray (5 Y 7/2) to light olive gray (5 Y 5/2); massive; fine-grained sand; medium plastic; moist.	
			<u>44.7-46.7' SAMPLE.</u> Recovered 1.0/2.0' = 50%. SANDY CLAYSTONE: medium gray (N 5/0) to grayish orange (10 YR 7/4); blocky; fine-grained sand; poorly sorted; moderately cemented; highly oxide stained; moist to damp.	
			<u>46.7-47.0' SAMPLE.</u> Recovered 0.3/0.3' = 100%. CLAYSTONE: dark greenish gray (5 G 4/1) slightly sandy; fine-grained; moder- ately cemented; damp.	
			TOTAL DEPTH: 47.0'	

WELL COMPLETION INFORMATION

Location Rocky Flats Plant; East Trenches Area Well No. 25-87BR
 Coordinates N 36727.08 E 23641.38 Elevation: Ground Surface 5958.91'
 Total Depth: Well 43.70' Top of Casing 5960.96'
 Borehole 47.00'

Formation of Completion Arapahoe Formation

Casing Material Sch 5, type 316 TFJ stainless steel

Casing Diameter 2" ID

Screen Material 0.010" wire wrap, type 316 TFJ stainless steel

Surface Casing Diameter 5" ID

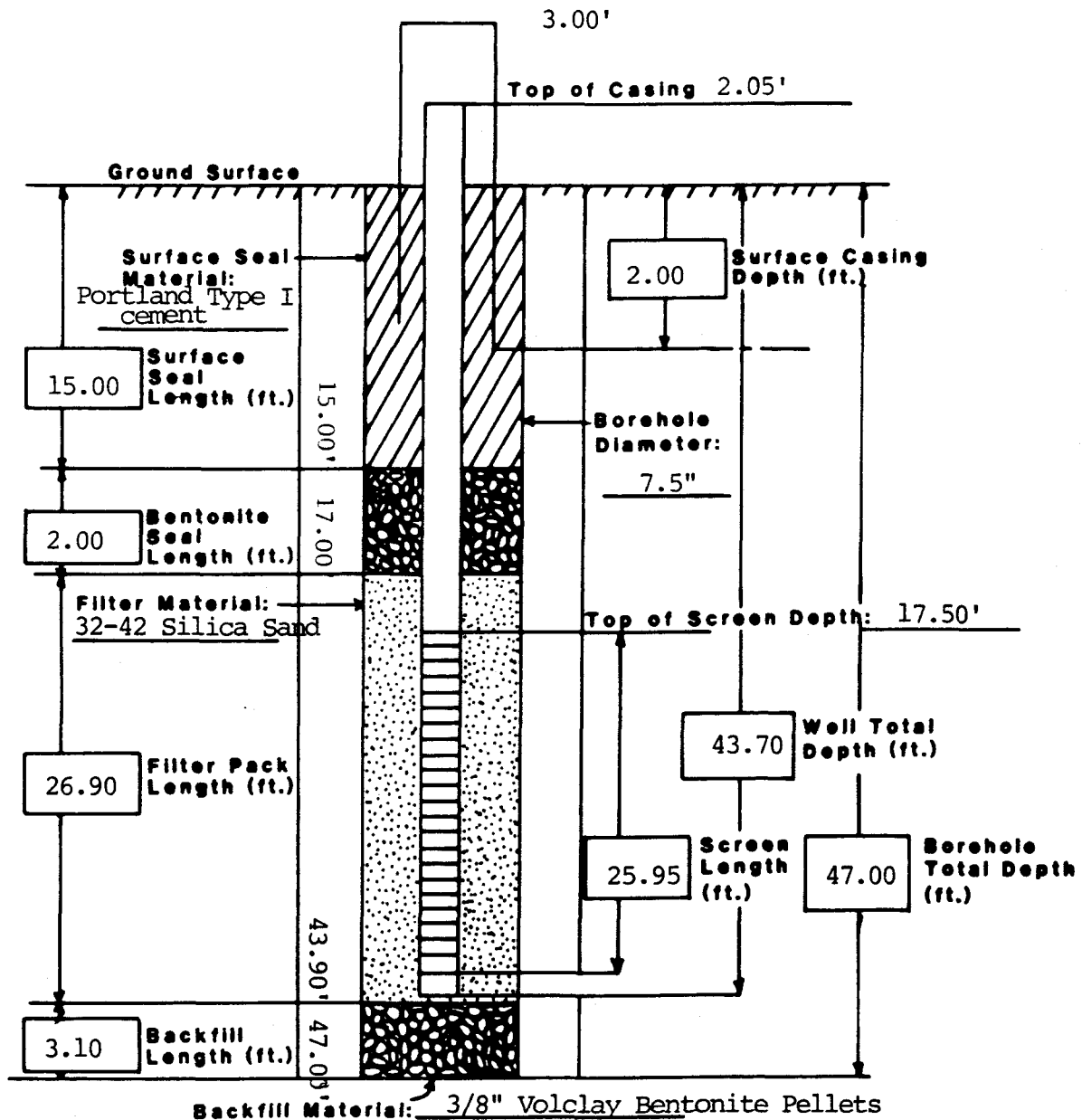
Date Installed Aug. 17, 1987

Approved By J. Pasella

Installed By R. T. Treat
 Geologist

Brent Lewis
 Site Manager
 CEARP Manager

Comments _____



PROGRAM SLUGT, VERSION 4.OCT. 1985

THIS PROGRAM CALCULATES MEAN TRANSMISSIVITIES FROM SLUG-TEST DATA BASED ON TWO ANALYTICAL APPROACHES:

- (1) METHOD OF COOPER, BREDEHOEFT AND PAPADOPULOS, 1967 (ARTICLE IN VOL.3, NO.1 OF WRR ENTITLED "RESPONSE OF A FINITE DIAMETER WELL TO AN INSTANTANEOUS CHARGE OF WATER")
- (2) METHOD OF BOUMER AND RICE, 1976 (ARTICLE IN VOL. 12, NO.3 OF WRR ENTITLED "A SLUG TEST FOR DETERMINING HYDRAULIC CONDUCTIVITY OF UNCONFINED AQUIFERS WITH COMPLETELY OR PARTIALLY PENETRATING WELLS")

PROJECT NO.: 6-0118-87

CLIENT: Rockwell International

LOCATION: Rocky Flats Plant

DATE OF SLUG TEST: 10-14-87

FIELD INVESTIGATOR: Kevin McNeill

WELL NO.: 25-87 BR

INPUT DATA ARE:

INNER CASING DIAMETER = 2.00 INCHES

INNER SCREEN OR OPEN-HOLE DIAMETER = 2.00 INCHES

DIAMETER OF DRILLED HOLE = 7.50 INCHES

ESTIMATED POROSITY OF GRAVEL PACK = .25

LENGTH OF SCREEN OR INTAKE PORTION = 20.80 FEET

DEPTH FROM STATIC LEVEL TO BOTTOM OF SCREEN = 20.80 FEET

THICKNESS OF SATURATED AQUIFER ZONE = 20.55 FEET

FALLING-HEAD INDEX = 0 ("1" IF FALLING, "0" IF RISING)

NUMBER OF HEAD-TIME DATA POINTS = 42

TIME (sec)	HEAD (FEET)
1.00	1.140
2.00	1.090
3.00	1.050
4.00	1.010
5.00	.970
6.00	.940
7.00	.900
8.00	.870
9.00	.840
10.00	.810
11.00	.780
12.00	.760
13.00	.730
14.00	.700
15.00	.680
16.00	.660
17.00	.640
18.00	.610
19.00	.600
20.00	.580
22.00	.540
25.00	.490
27.00	.460
30.00	.420
32.00	.400
35.00	.360
40.00	.310
45.00	.270
50.00	.240
55.00	.210
60.00	.180
70.00	.140
80.00	.120
88.00	.100
98.00	.080
118.00	.050
138.00	.040
158.00	.030
188.00	.020
218.00	.020
263.00	.010
383.00	.010

H0 WAS COMPUTED FROM INTERCEPT OF PLOT OF LOG(H) VS. TIME

SUCCESSIVE COMPUTED
VALUES FOR H0
(FEET)

.7271
.8443
.8871

.....

METHOD OF BOWEN AND RICE

COMPUTED RESULTS USING DIAMETER OF DRILLED HOLE:

PERMEABILITY = $5.03\text{E-}05$ FT/sec = $1.53\text{E-}03$ CM/sec
TRANSMISSIVITY = $1.03\text{E-}03$ FT²/sec

COMPUTED RESULTS USING DIAMETER OF CASING AND SCREEN:

PERMEABILITY = $1.59\text{E-}05$ FT/sec = $4.84\text{E-}04$ CM/sec
TRANSMISSIVITY = $3.26\text{E-}04$ FT²/sec

12/11/87

Water Level Data
for
Rockwell (Rocky Flats)

Date
Measured

Depth to Water
from TOC

Elevation
TOC (ft)

Water Level
Elev. (ft)

** Well Number: 25878R

12/01/87

23.95

5960.96

5937.01

12/11/87

Water Level Data
for
Rockwell (Rocky Flats)

Date
Measured

Depth to Water
from TOC

Elevation
TOC (ft)

Water Level
Elev. (ft)

** Well Number: 2587BR

12/01/87

23.95

5960.96

5937.01

INDEX OF DATA

Boring No.: 26-87

Completed as well? Yes

Data in File

- ☒ Log of Borehole
- ☒ Well Construction Summaries
- ☐ Well Development Summaries
- ☐ Hydraulic Conductivity Test Data
and Results
- ☐ Packer Test Data and Results
- ☒ Water Level Data

LOG OF BOREHOLE

Location Rocky Flats Plant; East Trenches Area

Coordinates N 36261.48 E 24381.98

Total Depth 18.00'

Drilling Company Boyles Bros

Date Drilled September 23, 1987

Drilling Method Hollow Stem Auger

Logged By R. T. Treat
Geologist

Borehole/Well No. 26-87

Ground Surface Elevation 5954.06'

Water Level Encountered _____

Static _____

Driller P. Mesa

Helper S. Bradfield

Drilling Fluid None

Checked By J. Pasello
Site Manager
Brent Harris
CEARP Manager

Comments _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
0			<u>TOPSOIL</u>	HNu Background=0.8 OVA Background=0.0
			<u>0.0-2.0' SAMPLE.</u> Recovered 1.3/2.0' = 65%. 0.0-0.3': TOPSOIL: dusky brown (5 YR 2/2); silty; fine-grained sands; gravels; poorly sorted; dry.	<u>4.0-6.0':</u> Reading on core: OVA = 1.6.
5			<u>ROCKY FLATS ALLUVIUM</u>	<u>6.0-8.0':</u> Reading on core: HNu = 1.4; OVA = 12.4.
			0.3-2.0': SAND AND GRAVEL: very pale orange (10 YR 8/2); silty; fine-grained sands; subangular to subrounded gravel; poorly sorted; weakly cemented; very calcareous; moist.	<u>14.0-16.0':</u> Reading on core: OVA = 12.2.
10			<u>2.0-4.0' SAMPLE.</u> Recovered 2.0/2.0' = 100%. SAND AND GRAVEL: same as above; moist.	
			<u>4.0-6.0' SAMPLE.</u> Recovered 1.1/2.0' = 55%. SAND AND GRAVEL: pale yellowish orange (10 YR 8/6) to moderate yellowish brown (10 YR 5/4); clayey; fine-grained sands; subangular to subrounded; poorly sorted; slightly calcareous; moderately cemented; moist.	
15				
20				

LOG OF BOREHOLE

Location Rocky Flats Plant; East Trenches Area

Coordinates N 36261.48 E 24381.98

Total Depth 18.00'

Drilling Company Boyles Bros

Date Drilled September 23, 1987

Drilling Method Hollow Stem Auger

Logged By R. T. Treat
Geologist

Borehole/Well No. 26-87

Ground Surface Elevation 5954.06'

Water Level Encountered _____

Static _____

Driller P. Mesa

Helper S. Bradfield

Drilling Fluid None

Checked By [Signature]
Site Manager

CEARP Manager

Comments _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			<u>6.0-8.0' SAMPLE.</u> Recovered 0.7/2.0' = 35%. SAND AND GRAVEL: grayish orange (10 YR 7/4); slightly silty; scattered gravels; poorly sorted; fine to medium-grained sands; weakly cemented; moist.	
			<u>8.0-10.0' SAMPLE.</u> Recovered 1.2/2.0' = 60%. SAND AND GRAVEL: grayish orange (10 YR 7/4) to dark yellowish orange (10 YR 6/6); clayey; fine-grained sand; subangular to subrounded gravels; weakly cemented; slightly calcareous; moist.	
			<u>10.0-12.0' SAMPLE.</u> Recovered 2.0/2.0' = 100%. CLAY AND GRAVEL: light gray (N 7/0); sandy; medium plastic; slightly calcareous; poorly sorted; moist.	
			<u>12.0-14.0' SAMPLE.</u> Recovered 1.4/2.0' = 70%. 12.0-13.2': SAND AND GRAVEL: same as above; moist.	
			<u>ARAPAHOE FORMATION</u>	
			13.2-14.0': CLAYSTONE: medium light gray (N 6/0); massive; blocky; slight Fe stained; weathered; moist.	

LOG OF BOREHOLE

Location Rocky Flats Plant; East Trenches Area

Coordinates N 36261.48 E 24381.98

Total Depth 18.00'

Drilling Company Boyles Bros

Date Drilled September 23, 1987

Drilling Method Hollow Stem Auger

Logged By R. T. Treat
Geologist

Borehole/Well No. 26-87

Ground Surface Elevation 5954.06'

Water Level Encountered _____

Static _____

Driller P. Mesa

Helper S. Bradfield

Drilling Fluid None

Checked By J. J. Pasche
Site Manager

CEARP Manager

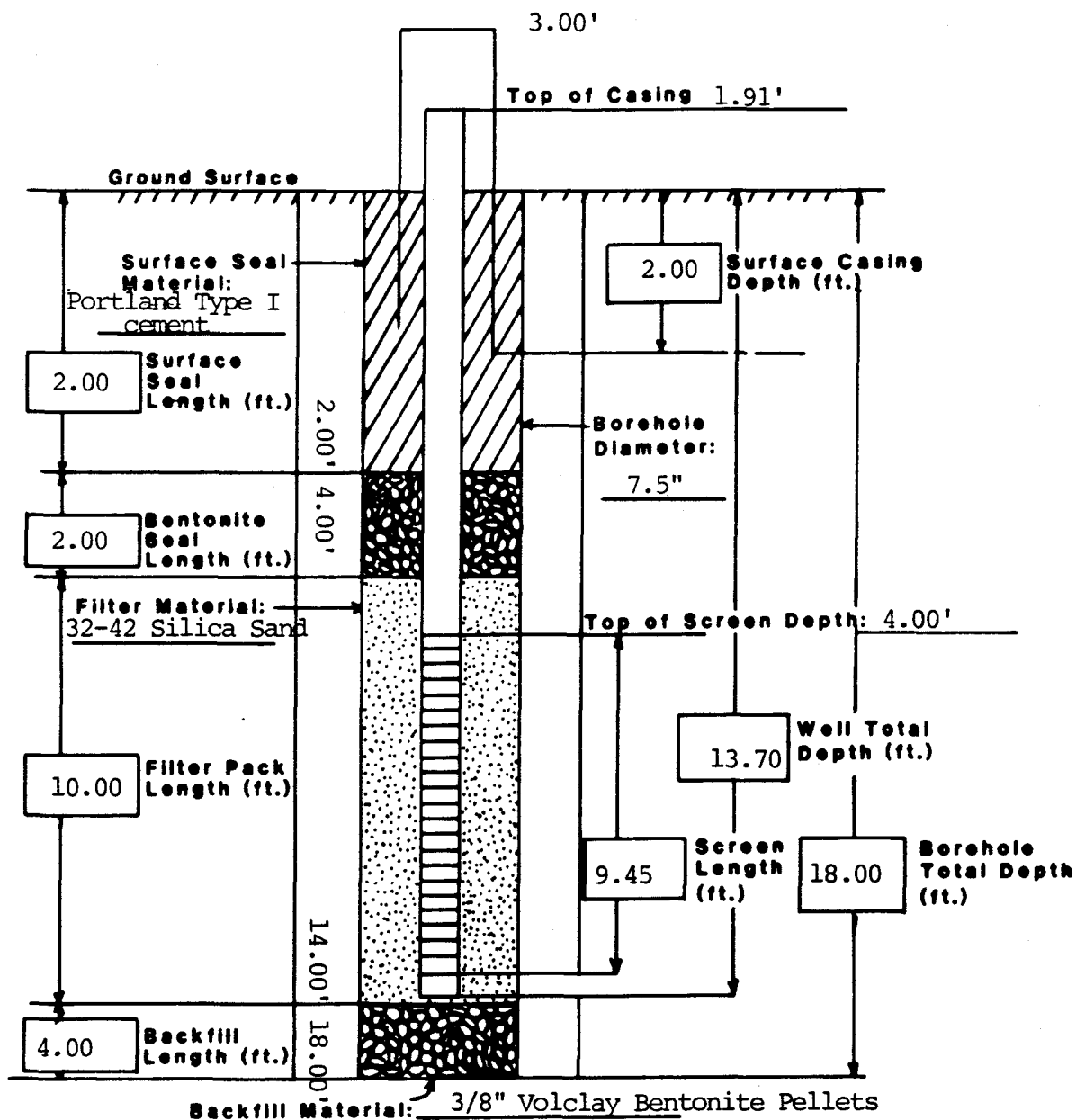
Comments _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			<u>14.0-16.0' SAMPLE.</u> Recovered 2.0/2.0' = 100%. CLAYSTONE: medium light gray (N 6/0) to medium gray (N 5/0); massive; blocky; slightly Fe stained; slightly calcareous; weathered; moist.	
			<u>16.0-18.0' SAMPLE.</u> Recovered 2.0/2.0' = 100%. CLAYSTONE: same as above; moist.	
			TOTAL DEPTH: 18.0'	

WELL COMPLETION INFORMATION

Location Rocky Flats Plant; East Trenches Area Well No. 26-87
 Coordinates N 36261.48 E 24381.98 Elevation: Ground Surface 5954.06'
 Total Depth: Well 13.70' Top of Casing 5955.97'
 Borehole 18.00'
 Formation of Completion Rocky Flats Alluvium
 Casing Material Sch 5, type 316 TFJ stainless steel Casing Diameter 2" ID
 Screen Material 0.010" wire wrap, type 316 TFJ stainless steel Surface Casing Diameter 5" ID
 Date Installed Sept. 24, 1987 Approved By *A. Pasolhe*
 Installed By R. T. Treat Site Manager
Geologist CEAPP Manager

Comments _____



12.11/87

Water Level Data
for
Rockwell (Rocky Flats)

Date
Measured

Depth to Water
from TOC

Elevation
TOC (ft)

Water Level
Elev. (ft)

** Well Number: 2687

12.01/87

12.53

5955.97

5943.44

INDEX OF DATA

Boring No.: 27-87

Completed as well? Yes

Data in File

- ☒ Log of Borehole
- ☒ Well Construction Summaries
- ☐ Well Development Summaries
- ☐ Hydraulic Conductivity Test Data
and Results
- ☐ Packer Test Data and Results
- ☒ Water Level Data

LOG OF BOREHOLE

Location <u>Rocky Flats Plant; East Trenches Area</u>	Borehole/Well No. <u>27-87</u>
Coordinates <u>N 36442.01 E 24944.62</u>	Ground Surface Elevation <u>5947.52'</u>
Total Depth <u>47.4'</u>	Water Level Encountered <u>36.5'</u>
	Static _____
Drilling Company <u>Boyles Bros</u>	Driller <u>T. Merritt; D. Jarvie</u>
Date Drilled <u>September 3-10, 1987</u>	Helper <u>J. Duncan; T. Merritt; P. Mesa</u>
Drilling Method <u>Hollow Stem Auger</u>	Drilling Fluid <u>None</u>
Logged By <u>J.L. Bannon</u>	Checked By <u><i>[Signature]</i></u>
Geologist	<u><i>[Signature]</i></u> Site Manager <u><i>[Signature]</i></u> CEARP Manager

Comments _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
0			<u>TOPSOIL</u> <u>0.0-1.5' SAMPLE.</u> Recovered 1.3/1.5' = 87%. 0.0-0.22': TOPSOIL: dusky brown (5 YR 2/2) clay with abundant roots and grasses.	HNu Background=0.2 OVA Background=0.8 No Ludlum readings taken.
5			<u>ROCKY FLATS ALLUVIUM</u> 0.22-1.0': SAND AND GRAVEL: very dusky red (10 R 2/2); very fine silty sand with occasional pebbles; unconsolidated. 1.0-1.3': SAND: grayish orange pink (10 R 8/2); fine-grained caliche sand; unconsolidated; strong HCl reaction.	No readings over background on core. No readings over background on core.
10			<u>1.5-3.0' SAMPLE.</u> Recovered 1.2/1.5' = 80%. SAND AND GRAVEL: moderate orange pink (5 YR 8/4); very fine-grained, clayey, caliche sand with subangular to subrounded quartzite pebbles, particularly at lower end; powdery; strong HCl reaction; dry.	<u>11.29'</u> : Readings on cuttings: HNu = 0.8; OVA = 0.2.
15			<u>3.0-4.0' SAMPLE.</u> Recovered 1.45/1.0' = 145%. SAND AND GRAVEL: very pale orange (10 YR 8/2) to pale yellowish orange (10 YR 8/6) very fine-grained clayey sand with abundant subangular to subrounded caliche-coated quartzite pebbles; strong HCl reaction; dry.	<u>17.2'</u> : OVA = 5.0 at cuttings, 0.8 at well head.
20				

LOG OF BOREHOLE

Location <u>Rocky Flats Plant; East Trenches Area</u>	Borehole/Well No. <u>27-87</u>
Coordinates <u>N 36442.01 E 24944.62</u>	Ground Surface Elevation <u>5947.52'</u>
Total Depth <u>47.4'</u>	Water Level Encountered <u>36.5'</u>
	Static _____
Drilling Company <u>Boyles Bros</u>	Driller <u>T. Merritt; D. Jarvie</u>
Date Drilled <u>September 3-10, 1987</u>	Helper <u>J. Duncan; T. Merritt; P. Mesa</u>
Drilling Method <u>Hollow Stem Auger</u>	Drilling Fluid <u>None</u>
Logged By <u>J.L. Bannon</u> Geologist	Checked By <u><i>J.P. ...</i></u> Site Manager
	CEARP Manager

Comments _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
20			<p><u>4.0-4.5' SAMPLE.</u> Recovered 0.65/0.5' = 130%. SAND AND GRAVEL: dark yellowish brown (10 YR 4/2) to moderate brown (5 YR 4/4); poorly sorted very fine to coarse-grained clayey caliche sand with subangular to subrounded caliche-coated quartzite pebbles; unconsolidated to moderately consolidated down-core; strong HCl reaction on pebble surface, weak on fresh surfaces; dry to damp.</p>	
25			<p><u>4.5-5.0' SAMPLE.</u> Recovered 0.42/0.5' = 84%. SAND: dark yellowish orange (10 YR 6/6); medium-grained, clayey sand; unconsolidated; strong HCl reaction; damp.</p>	
30			<p><u>5.0-5.5' SAMPLE.</u> Recovered 0.71/0.5' = 142%. SAND AND GRAVEL: dark yellowish orange (10 YR 6/6); medium-grained, clayey sand with abundant subangular to subrounded quartzite pebbles near bottom; unconsolidated; strong HCl reaction; damp.</p>	
35				
40				

LOG OF BOREHOLE

Location Rocky Flats Plant; East Trenches Area Borehole/Well No. 27-87
 Coordinates N 36442.01 E 24944.62 Ground Surface Elevation 5947.52'
 Total Depth 47.4' Water Level Encountered 36.5'
 Static _____
 Drilling Company Boyles Bros Driller T. Merritt; D. Jarvie
 Date Drilled September 3-10, 1987 Helper J. Duncan; T. Merritt; P. Mesa
 Drilling Method Hollow Stem Auger Drilling Fluid None
 Logged By J.L. Bannon Checked By J. Pascello
 Geologist Site Manager
 CEARP Manager

Comments _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
40			<p><u>5.5-6.0' SAMPLE.</u> Recovered 0.58/0.5' = 116%. 5.5-5.72': SAND AND GRAVEL: dark yellowish orange (10 YR 6/6); medium-grained, clayey sand with abundant quartzite pebbles; unconsolidated; damp. 5.72-6.0': grayish orange pink (5 YR 7/2); fine-grained clayey sand with pebbles; unconsolidated; strong HCl reaction; very dry.</p> <p><u>6.0-6.5' SAMPLE.</u> No recovery. Drilled with center bit.</p> <p><u>6.5-7.5' SAMPLE.</u> Recovered 0.61/1.0' = 61%. SAND AND GRAVEL: dark yellowish orange (10 YR 6/6); medium to coarse-grained clayey sand with abundant quartzite pebbles; unconsolidated; moist.</p> <p><u>7.5-8.5' SAMPLE.</u> Recovered .75/1.0' = 75%. SAND AND GRAVEL: moderate yellowish brown (10 YR 5/4); coarse-grained clayey sand with abundant caliche-coated quartzite pebbles; moist. Grades downward into moderate orange pink (10 R 7/4) fine to medium-grained, poorly sorted quartz sand; minor clay; unconsolidated; strong HCl reaction; dry.</p>	
45				
50				

LOG OF BOREHOLE

Location Rocky Flats Plant; East Trenches Area Borehole/Well No. 27-87
 Coordinates N 36442.01 E 24944.62 Ground Surface Elevation 5947.52'
 Total Depth 47.4' Water Level Encountered 36.5'
 Static _____
 Drilling Company Boyles Bros Driller T. Merritt; D. Jarvie
 Date Drilled September 3-10, 1987 Helper J. Duncan; T. Merritt; P. Mesa
 Drilling Method Hollow Stem Auger Drilling Fluid None
 Logged By J.L. Bannon Checked By *Site Manager*
 Geologist _____
 CEARP Manager _____

Comments _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			TOTAL DEPTH WITH PLOPPER: 8.3'; READJUST DEPTH.	
			<u>8.3-9.4' SAMPLE.</u> No recovery. Drilled with center bit.	
			<u>9.4-10.0' SAMPLE.</u> Recovered 0.52/0.6' = 87%. SAND AND GRAVEL: dark yellowish brown (10 YR 4/2) grading down into light olive gray (5 Y 6/1); fine to coarse- grained, poorly sorted clayey sand; peb- bles less abundant; still subangular to subrounded quartz and quartzite; less caliche; moderately consolidated; moder- ate HCl reaction; damp.	
			TOTAL DEPTH WITH PLOPPER: 10.1'; READJUST DEPTH.	
			<u>10.1-11.29' SAMPLE.</u> No recovery. Drilled with center bit.	
			<u>11.29-11.9' SAMPLE.</u> Recovered 0.61/0.61' = 100%. SAND AND GRAVEL: moderate reddish brown (10 R 4/6); fine to coarse-grained, poorly sorted clayey sand with large quartzite pebbles; moderately consoli- dated; minor caliche; weak HCl reaction; damp.	

LOG OF BOREHOLE

Location Rocky Flats Plant; East Trenches Area Borehole/Well No. 27-87
 Coordinates N 36442.01 E 24944.62 Ground Surface Elevation 5947.52'
 Total Depth 47.4' Water Level Encountered 36.5'
 Drilling Company Boyles Bros Static _____
 Date Drilled September 3-10, 1987 Driller T. Merritt; D. Jarvie
 Drilling Method Hollow Stem Auger Helper J. Duncan; T. Merritt; P. Mesa
 Logged By J.L. Bannon Drilling Fluid None
 Geologist _____ Checked By J. Pasche
 Site Manager _____
 CEARP Manager _____

Comments _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			<u>11.9-12.15' SAMPLE.</u> Recovered 0.6/0.25' = 240%. SAND AND GRAVEL: moderate yellowish brown (10 YR 5/4); fine-grained, clayey sand; weak HCl reaction.	
			<u>12.15-13.15' SAMPLE.</u> Recovered 0.84/1.0' = 84%. SAND AND GRAVEL: moderate brown (5 YR 4/4) grading down into light brown (5 YR 5/6); medium to coarse-grained, clayey sand; unconsolidated; strong HCl reaction, weak down-core; moist.	
			<u>13.15-14.65' SAMPLE.</u> Recovered 1.2/1.5' = 80%. SAND AND GRAVEL: light brown (5 YR 5/6), fine to medium-grained, clayey sand with abundant subangular to subround quartzite pebbles; moderately consolidated; very weak HCl reaction; moist.	
			TOTAL DEPTH WITH PLOPPER: 13.4'; Readjust depth.	
			<u>13.4-14.9' SAMPLE.</u> Recovered 1.7/1.5' = 113%. SAND AND GRAVEL: light brown (5 YR 5/6), fine to coarse-grained, poorly sorted, clayey sand with large cobbles of subangular quartzite; consolidated; weak HCl reaction; moist.	

LOG OF BOREHOLE

Location Rocky Flats Plant; East Trenches Area Borehole/Well No. 27-87
 Coordinates N 36442.01 E 24944.62 Ground Surface Elevation 5947.52'
 Total Depth 47.4' Water Level Encountered 36.5'
 Static _____
 Drilling Company Boyles Bros Driller T. Merritt; D. Jarvie
 Date Drilled September 3-10, 1987 Helper J. Duncan; T. Merritt; P. Mesa
 Drilling Method Hollow Stem Auger Drilling Fluid None
 Logged By J.L. Bannon Checked By J. Pasella
 Geologist Site Manager
 CEARP Manager

Comments _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			<u>14.9-15.15' SAMPLE.</u> Recovered 0.26/0.25' = 104%. SAND AND GRAVEL: same as above.	
			<u>15.15-15.9' SAMPLE.</u> No recovery. Drilled with center bit.	
			<u>15.9-17.2' SAMPLE.</u> Recovered 1.1/1.3' = 85%. SAND AND GRAVEL: moderate reddish brown (10 R 4/6), medium to coarse- grained, poorly sorted sand with abun- dant large quartzite cobbles; minor clay; consolidated; moist.	
			<u>17.2-18.0' SAMPLE.</u> No recovery. Drilled with center bit.	
			<u>18.0-19.0' SAMPLE.</u> Recovered 1.04/1.0' = 104%. SAND: moderate brown (5 YR 4/4), fine- grained, well sorted clayey sand; uncon- solidated; moist.	
			TOTAL DEPTH WITH PLOPPER: 19.1'; Readjust depth.	
			<u>19.1-21.1' SAMPLE.</u> Recovered 2.02/2.0' = 101%. SAND: moderate brown (5 YR 4/4), fine- grained, well sorted clayey sand; uncon- solidated; no pebbles; no HCl reaction; moist.	

LOG OF BOREHOLE

Location Rocky Flats Plant; East Trenches Area Borehole/Well No. 27-87
 Coordinates N 36442.01 E 24944.62 Ground Surface Elevation 5947.52'
 Total Depth 47.4' Water Level Encountered 36.5'
 Static _____
 Drilling Company Boyles Bros Driller T. Merritt; D. Jarvie
 Date Drilled September 3-10, 1987 Helper J. Duncan; T. Merritt; P. Mesa
 Drilling Method Hollow Stem Auger Drilling Fluid None
 Logged By J.L. Bannon Checked By J. J. Paschke
 Geologist Site Manager
 CEARP Manager

Comments _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			<u>21.1-23.1' SAMPLE.</u> Recovered 1.78/2.0' = 89%. SAND: moderate reddish brown (10 R 4/6), fine-grained, very well sorted clayey sand; consolidated; no HCl reaction; moist.	
			<u>23.1-25.1' SAMPLE.</u> Recovered 2.0/2.0' = 100%. SAND: moderate reddish brown (10 R 4/6), fine-grained, very well sorted clayey sand; consolidated with 0.3' of pebbly sand; subangular to subrounded quartzite; moist.	
			<u>25.1-27.1' SAMPLE:</u> Recovered 1.9/2.0' = 95%. SAND AND GRAVEL: moderate yellowish brown (10 YR 5/4) fine-grained, well sorted sand with pebble layers; consolidated; moist.	
			<u>27.1-28.6' SAMPLE.</u> Recovered 1.65/1.5' = 110%. SAND AND GRAVEL: light brown (5 YR 5/6) very fine-grained, well sorted clayey sand with quartzite pebble layers; consolidated; moist.	
			<u>28.6-31.9' SAMPLE.</u> No recovery. Drilled with center bit.	

LOG OF BOREHOLE

Location Rocky Flats Plant; East Trenches Area Borehole/Well No. 27-87
 Coordinates N 36442.01 E 24944.62 Ground Surface Elevation 5947.52'
 Total Depth 47.4' Water Level Encountered 36.5'
 Drilling Company Boyles Bros Static _____
 Date Drilled September 3-10, 1987 Driller T. Merritt; D. Jarvie
 Drilling Method Hollow Stem Auger Helper J. Duncan; T. Merritt; P. Mesa
 Logged By J.L. Bannon Drilling Fluid None
Geologist Checked By J. Paeleke
Site Manager
CEARP Manager

Comments _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			<u>31.9-33.9' SAMPLE.</u> Recovered 1.68/2.0' = 84%. SAND: light brown (5 YR 5/6) fine to medium-grained clayey sand; clay increases down core; no HCl reaction; moist.	
			<u>33.9-35.9' SAMPLE.</u> Recovered 1.96/2.0' = 98%. SAND AND GRAVEL: light brown (5 YR 5/6) fine to medium-grained sand with abundant quartzite pebbles down core; moist.	
			<u>35.9-37.9' SAMPLE.</u> Recovered 1.99/2.0' = 99%. SAND: light brown (5 YR 5/6) medium to coarse-grained, clayey sand with occasional large quartzite cobbles. WATER TABLE at 36.5': lower 0.42' core is yellowish gray (5 Y 7/2) very fine silty sand; moist.	
			TOTAL DEPTH WITH PLOPPER: 36.9'; READJUST DEPTH.	
			<u>36.9-38.9' SAMPLE.</u> Recovered 1.7/2.0' = 85%. 36.90-37.72': SAND: moderate brown (5 YR 4/4); medium to coarse-grained sand; moist. 37.72-38.00': SAND AND SILT: yellowish gray (5 Y 7/2) very fine-grained, clayey sand and silt.	

LOG OF BOREHOLE

Location Rocky Flats Plant; East Trenches Area Borehole/Well No. 27-87
 Coordinates N 36442.01 E 24944.62 Ground Surface Elevation 5947.52'
 Total Depth 47.4' Water Level Encountered 36.5'
 Static _____
 Drilling Company Boyles Bros Driller T. Merritt; D. Jarvie
 Date Drilled September 3-10, 1987 Helper J. Duncan; T. Merritt; P. Mesa
 Drilling Method Hollow Stem Auger Drilling Fluid None
 Logged By J.L. Bannon Checked By J. P. [Signature]
 Geologist Site Manager
 CEARP Manager

Comments _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			38.00-38.55': SAND: mottled yellowish gray (5 Y 7/2), very fine-grained clayey sand and oxidized light brown (5 YR 5/6) fine to medium-grained sand.	
			38.55-38.9': SAND: poorly sorted medium to coarse-grained, pebbly sand.	
			<u>38.9-40.9' SAMPLE.</u>	
			Recovered 1.41/2.0' = 70%.	
			SAND AND GRAVEL: moderate brown (5 YR 4/4), poorly sorted fine to medium-grained sand with pebbles; thin (.16') layer of pale yellowish brown (10 YR 6/2) clayey sand; unconsolidated; very wet.	
			<u>40.9-42.9' SAMPLE.</u>	
			Recovered 1.65/2.0' = 82%.	
			40.9-42.75': SAND AND GRAVEL: poorly sorted; medium to coarse-grained sand with abundant subangular to subrounded quartzite pebbles; unconsolidated; very wet.	
			<u>ARAPAHOE FORMATION</u>	
			42.75-42.9': CLAYSTONE: light olive gray (5 Y 5/2) mottled clay; consolidated; moist.	

LOG OF BOREHOLE

Location <u>Rocky Flats Plant; East Trenches Area</u>	Borehole/Well No. <u>27-87</u>
Coordinates <u>N 36442.01 E 24944.62</u>	Ground Surface Elevation <u>5947.52'</u>
Total Depth <u>47.4'</u>	Water Level Encountered <u>36.5'</u>
	Static _____
Drilling Company <u>Boyles Bros</u>	Driller <u>T. Merritt; D. Jarvie</u>
Date Drilled <u>September 3-10, 1987</u>	Helper <u>J. Duncan; T. Merritt; P. Mesa</u>
Drilling Method <u>Hollow Stem Auger</u>	Drilling Fluid <u>None</u>
Logged By <u>J.L. Bannon</u> Geologist	Checked By <u><i>[Signature]</i></u> Site Manager
	CEARP Manager _____

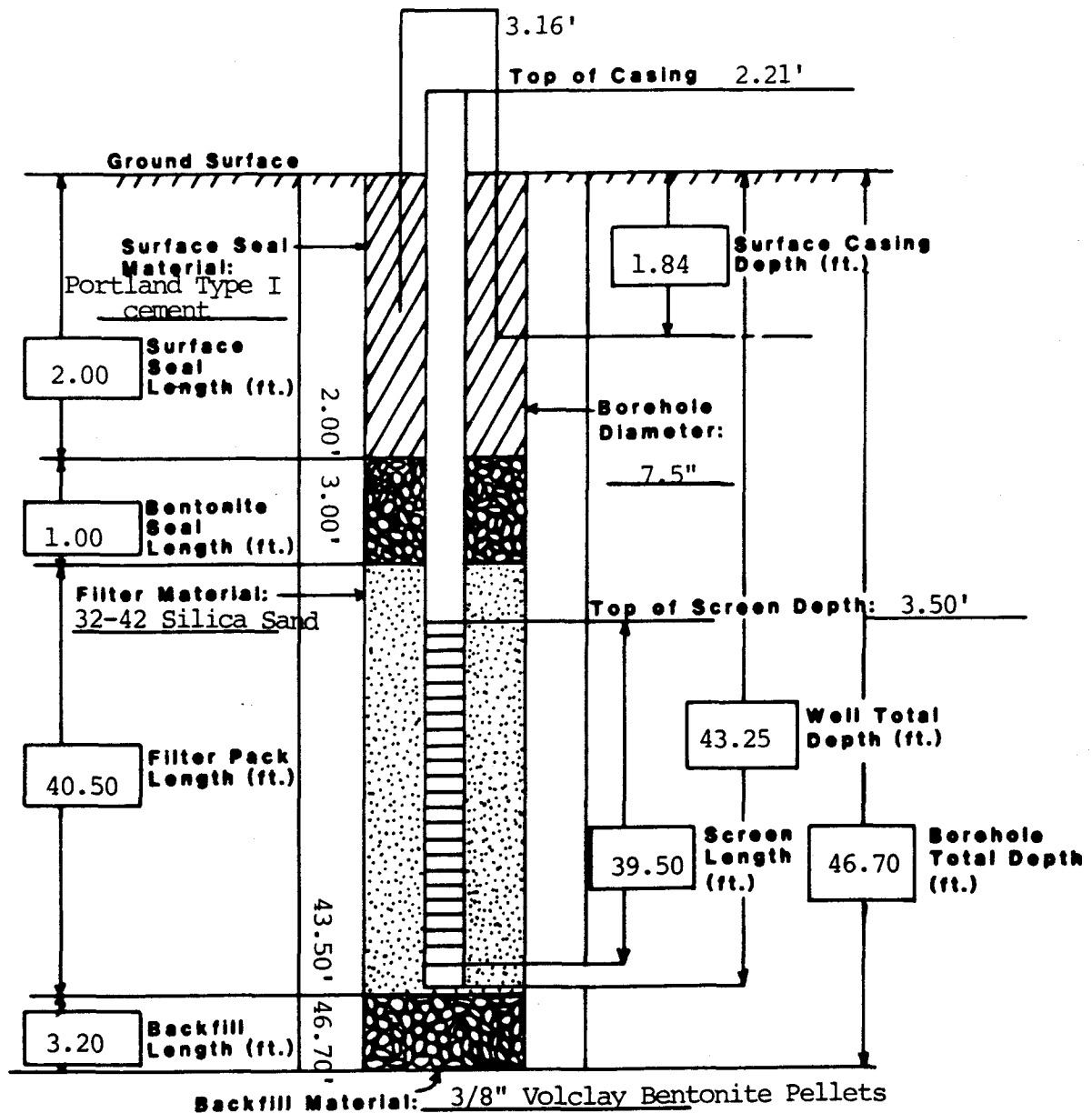
Comments _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			<p><u>42.9-44.9' SAMPLE.</u> Recovered 2.27/2.0' = 113%. CLAYSTONE: light olive gray (5 Y 5/2) mottled clay beneath coarse-grained, unconsolidated slough; very wet.</p>	
			<p><u>44.9-45.9' SAMPLE.</u> Recovered 1.6/1.0' = 160%. CLAYSTONE: light olive gray (5 Y 5/2) mottled clay; unconsolidated top .6'; con- solidated down core.</p>	
			<p><u>45.9-47.4' SAMPLE.</u> Recovered 1.88/1.5' = 125%. CLAYSTONE: light olive gray (5 Y 5/2) with mottled dusky yellow (5 Y 6/4) clay.</p>	
			TOTAL DEPTH: 47.40'	

WELL COMPLETION INFORMATION

Location Rocky Flats Plant; East Trenches Area Well No. 27-87
 Coordinates N 36442.01 E 24944.62 Elevation: Ground Surface 5947.52'
 Total Depth: Well 43.25' Top of Casing 5949.73'
 Borehole 46.70'
 Formation of Completion Rocky Flats Alluvium
 Casing Material Sch 5, type 316 TFJ stainless steel Casing Diameter 2" ID
 Screen Material 0.010" wire wrap, type 316 TFJ stainless steel Surface Casing Diameter 5" ID
 Date Installed Sept. 10, 1987 Approved By *A. Passelle*
 Installed By J. L. Bannon *Brent Lewis*
 Geologist CEARP Manager

Comments _____



12/11/87

Water Level Data
for
Rockwell (Rocky Flats)

<u>Date Measured</u>	<u>Depth to Water from TOC</u>	<u>Elevation TOC (ft)</u>	<u>Water Level Elev. (ft)</u>
--------------------------	------------------------------------	-------------------------------	-----------------------------------

** Well Number: 2787

11/09/87	87.10	5949.73	5862.63
12/01/87	42.65	5949.73	5907.08

INDEX OF DATA

Boring No.: 28-87BR

Completed as well? Yes

Data in File

- ☒ Log of Borehole
- ☒ Well Construction Summaries
- ☐ Well Development Summaries
- ☐ Hydraulic Conductivity Test Data
and Results
- ☒ Packer Test Data and Results
- ☐ Water Level Data

LOG OF BOREHOLE

Location Rocky Flats Plant; East Trenches Area Borehole/Well No. 28-87BR
 Coordinates N 36442.31 E 24983.42 Ground Surface Elevation 5947.17'
 Total Depth 207.00' Water Level Encountered 17.7'
 Drilling Company Boyles Bros Driller R. Sharp; P. Bushkovski
 Date Drilled Sept. 3-9; Sept. 11-15, 1987 Helper S. Bradfield; K. Parker
 Drilling Method Hollow Stem Auger; Rotary Core Drilling Fluid 0.0-55.5': None
 Logged By J.B. Bergman; R.T. Treat Checked By Site Manager
 Geologist CEARP Manager

Comments Surface casing set to 55.5' by J.B. Bergman on September 8, 1987.

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
0			ROCKY FLATS ALLUVIUM	
			<u>0.0-2.0' SAMPLE.</u> Recovered 1.3/2.0' = 65%. 0.0-0.5': CLAY AND GRAVEL: grayish brown (5 YR 3/2); abundant quartzite pebbles; roots and grasses on top; poorly sorted; unconsolidated; angular; dry. 0.5-1.3': SAND AND GRAVEL: moderate yellowish brown (10 YR 5/4); medium to coarse-grained; unsorted; unconsolidated; abundant quartzite pebbles and gravels; some caliche; dry.	HNu Background=0.4 OVA Background=0.0 No Ludlum readings taken. No readings over background on core.
5			<u>2.0-4.0' SAMPLE.</u> Recovered 1.4/2.0' = 70%. SAND AND GRAVEL: moderate yellowish brown (10 YR 5/4); medium to coarse-grained; abundant quartzite gravels and pebbles; some clay; some caliche; unconsolidated; unsorted; dry.	6.0': Readings at well head: HNu = 1; OVA = 22.
10			<u>4.0-6.0' SAMPLE.</u> Recovered 1.0/2.0' = 50%. SANDY CLAY AND GRAVEL: moderate brown (5 YR 4/4); medium to coarse-grained; unsorted; angular; abundant; light brown (5 YR 4/2) iron nodules and stains; abundant caliche; dry.	
15			<u>6.0-8.0' SAMPLE.</u> Recovered 1.1/2.0' = 55%. SANDY CLAY AND GRAVEL: same as above; dry to slightly damp.	
20				

LOG OF BOREHOLE

Location Rocky Flats Plant; East Trenches Area Borehole/Well No. 28-87BR
 Coordinates N 36442.31 E 24983.42 Ground Surface Elevation 5947.17'
 Total Depth 207.00' Water Level Encountered 17.7'
 Static _____
 Drilling Company Boyles Bros Driller R. Sharp; P. Bushkovski
 Date Drilled Sept. 3-9; Sept. 11-15, 1987 Helper S. Bradfield; K. Parker
 Drilling Method Hollow Stem Auger; Rotary Core Drilling Fluid 0.0-55.5': None
 Logged By J.B. Bergman; R.T. Treat 55.5'-207.0': Water *[Signature]*
 Geologist Checked By _____ Site Manager

CEARP Manager

Comments Surface casing set to 55.5' by J.B. Bergman on September 8, 1987.

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
20			<p><u>8.0-10.0' SAMPLE.</u> Recovered 1.8/2.0' = 90%. SANDY CLAY AND GRAVEL: moderate brown (5 YR 4/4); abundant quartzite pebbles and gravels; angular to sub-rounded; fine to medium-grained sand; FeO stains-dark yellowish orange (10 YR 6/6); unsorted; some caliche; slightly consolidated; dry.</p>	
25			<p><u>10.0-12.0' SAMPLE.</u> Recovered 1.3/2.0' = 65%. SANDY CLAY AND GRAVEL: same as above; caliche stops at 10.5'; slightly damp.</p>	
30			<p><u>12.0-14.0' SAMPLE.</u> Recovered 1.3/2.0' = 65%. SAND AND GRAVEL: moderate brown (5 YR 4/4); abundant coarse-grained sand and gravel; poorly sorted; unconsolidated; some clay; subangular to rounded; some caliche; moist.</p>	
35			<p>TOTAL DEPTH WITH PLOPPER: 13.7'; READJUST DEPTH.</p>	
40			<p><u>13.7-15.7' SAMPLE.</u> Recovered 1.5/2.0' = 75%. SANDY CLAY AND GRAVEL: moderate brown (5 YR 4/4); abundant quartzite pebbles and gravels; angular; poorly sorted; very fine-grained sand; homogeneous; trace caliche; unconsolidated; moist.</p>	

LOG OF BOREHOLE

Location Rocky Flats Plant; East Trenches Area Borehole/Well No. 28-87BR
 Coordinates N 36442.31 E 24983.42 Ground Surface Elevation 5947.17'
 Total Depth 207.00' Water Level Encountered 17.7'
 Static _____
 Drilling Company Boyles Bros Driller R. Sharp; P. Bushkovski
 Date Drilled Sept. 3-9; Sept. 11-15, 1987 Helper S. Bradfield; K. Parker
 Drilling Method Hollow Stem Auger; Rotary Core Drilling Fluid 0.0-55.5': None
 Logged By J.B. Bergman; R.T. Treat Checked By 55.5'-207.0': Water
 Geologist _____ Site Manager _____
 CEARP Manager _____

Comments Surface casing set to 55.5' by J.B. Bergman on September 8, 1987.

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
40			<u>15.7-17.7' SAMPLE.</u> Recovered 1.1/2.0' = 55%. SAND AND GRAVEL: same as above but less clay and more medium to coarse-grained sand; moist.	
45			<u>17.7-19.7' SAMPLE.</u> Recovered 1.3/2.0' = 65%. CLAY AND GRAVEL: moderate brown (5 YR 4/4); abundant quartzite gravels; trace caliche; consolidated; moderately poor sorting; moist to wet.	
50			<u>19.7-21.3' SAMPLE.</u> Recovered 1.6/1.6' = 100%. 19.7-20.1': CLAY AND GRAVEL: same as above; wet. 20.1-21.3': SANDY CLAY AND GRAVEL: same as above but more clay content; fewer gravels; very fine-grained sand; damp.	
55			<u>21.3-23.3' SAMPLE.</u> Recovered 2.0/2.0' = 100%. CLAY: moderate brown (5 YR 4/4); abundant gravels and pebbles in top 1.3'; trace coarse-grained sand; quartzose sand; rounded; some granite; trace caliche; poor to moderate sorting; wet.	
60			<u>23.3-25.3' SAMPLE.</u> Recovered 2.0/2.0' = 100%. CLAY AND GRAVEL: moderate brown (5 YR 4/4); abundant quartzite pebbles and gravels; some FeO stains; moderate red (5 R 4/6); angular; poorly sorted; very moist.	

LOG OF BOREHOLE

Location Rocky Flats Plant; East Trenches Area Borehole/Well No. 28-87BR
 Coordinates N 36442.31 E 24983.42 Ground Surface Elevation 5947.17'
 Total Depth 207.00' Water Level Encountered 17.7'
 Static _____
 Drilling Company Boyles Bros Driller R. Sharp; P. Bushkovski
 Date Drilled Sept. 3-9; Sept. 11-15, 1987 Helper S. Bradfield; K. Parker
 Drilling Method Hollow Stem Auger; Rotary Core Drilling Fluid 0.0-55.5': None
 Logged By J.B. Bergman; R.T. Treat Checked By 55.5'-207.0': Water
 Geologist _____ Site Manager _____

CEARP Manager

Comments Surface casing set to 55.5' by J.B. Bergman on September 8, 1987.

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
60			<p><u>25.3-27.3' SAMPLE.</u> Recovered 2.0/2.0' = 100%. GRAVEL: moderate brown (5 YR 4/4); quartzite gravels; some quartzose coarse-grained sand; FeO nodules; angular to subrounded; unconsolidated; wet.</p>	
65			<p><u>27.3-29.3' SAMPLE.</u> Recovered 2.0/2.0' = 100%. GRAVEL: same as above; at 29.0' hit thin (0.10') sand nodules-grayish orange (10 YR 7/4); coarse-grained; angular to sub-angular; non-calcareous; some FeO stains-dusky red (5 R 3/4) in shoe; wet.</p>	
70			<p><u>29.3-30.1' SAMPLE.</u> Recovered 0.8/0.8' = 100%. SAND AND GRAVEL: moderate brown (5 YR 4/4); quartzite gravels and pebbles; trace clay; angular; poorly sorted; large cobble of quartzite in shoe; unconsolidated; damp.</p>	
75			<p><u>30.6-32.6' SAMPLE.</u> Recovered 1.2/2.0' = 60%. SANDY CLAY AND GRAVEL: moderate brown (5 YR 4/4); abundant quartzite gravels and pebbles at top; decrease content with depth; medium to fine-grained sand; consolidated; angular; poorly sorted; moist.</p>	
80				

LOG OF BOREHOLE

Location Rocky Flats Plant; East Trenches Area Borehole/Well No. 28-87BR
 Coordinates N 36442.31 E 24983.42 Ground Surface Elevation 5947.17'
 Total Depth 207.00' Water Level Encountered 17.7'
 Static _____
 Drilling Company Boyles Bros Driller R. Sharp; P. Bushkovski
 Date Drilled Sept. 3-9; Sept. 11-15, 1987 Helper S. Bradfield; K. Parker
 Drilling Method Hollow Stem Auger; Rotary Core Drilling Fluid 0.0-55.5': None
 Logged By J.B. Bergman; R.T. Treat Checked By 55.5'-207.0': Water
 Geologist _____ Site Manager _____

CEARP Manager

Comments Surface casing set to 55.5' by J.B. Bergman on September 8, 1987.

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
80			<p><u>32.6-34.6' SAMPLE.</u> Recovered 1.7/2.0' = 85%. SANDY CLAY AND GRAVEL: moderate brown (5 YR 4/4); abundant quartzite gravels; coarse-grained quartzose sand; abundant black fragments; large quartzite pebbles at base; unsorted; consolidated; rounded to subangular; moist.</p> <p>TOTAL DEPTH WITH PLOPPER: 35.3'; READJUST DEPTH.</p> <p><u>35.3-37.3' SAMPLE.</u> Recovered 1.3/2.0' = 65%. CLAYEY SAND AND GRAVEL: moderate brown (5 YR 4/4); abundant quartzite gravels; medium to coarse-grained quartzose sand; some clay; angular to sub-rounded; poorly sorted; slightly moist.</p> <p><u>37.3-39.3' SAMPLE.</u> Recovered 1.4/2.0' = 70%. SAND AND GRAVEL: same as above but trace clay; abundant gravels from 37.3-37.6'; saturated; poorly sorted; abundant mica; wet.</p>	
85				
90				
95				
100				

LOG OF BOREHOLE

Location Rocky Flats Plant; East Trenches Area Borehole/Well No. 28-87BR
 Coordinates N 36442.31 E 24983.42 Ground Surface Elevation 5947.17'
 Total Depth 207.00' Water Level Encountered 17.7'
 Drilling Company Boyles Bros Driller R. Sharp; P. Bushkovski
 Date Drilled Sept. 3-9; Sept. 11-15, 1987 Helper S. Bradfield; K. Parker
 Drilling Method Hollow Stem Auger; Rotary Core Drilling Fluid 0.0-55.5': None
 Logged By J.B. Bergman; R.T. Treat Checked By 55.5'-207.0': Water
 Geologist Site Manager

CEARP Manager

Comments Surface casing set to 55.5' by J.B. Bergman on September 8, 1987.

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
100			<p><u>39.3-41.3' SAMPLE.</u> Recovered 1.8/2.0' = 90%. 39.3-40.0': SAND AND GRAVEL: same as above; slightly damp. 40.0-40.7': SAND: light olive gray (5 Y 6/1); coarse to fine-grained; rounded; well sorted; homogeneous; consolidated; mica-ceous; abundant clay; slightly damp. 40.7-41.1': SAND: same as above with abundant dark yellowish orange (10 YR 6/6) nodules; layered <.05'; slightly damp.</p> <p><u>41.3-43.3' SAMPLE.</u> Recovered 2.0/2.0' = 100%. SAND AND GRAVEL: moderate brown (5 YR 4/4); abundant quartzite gravels; coarse-grained quartzose sand; unconsolidated; unsorted; angular; wet.</p> <p><u>43.3-43.5' SAMPLE.</u> Recovered 0.2/0.2' = 100%. SAND AND GRAVEL: light brown (5 YR 5/1) to moderate brown (5 YR 4/4); sub-rounded to subangular in both sands and gravel; poorly sorted; noncemented; wet.</p> <p><u>ARAPAHOE FORMATION</u></p> <p><u>43.5-44.5' SAMPLE.</u> No recovery. Assumed weathered claystone, sandy.</p> <p><u>44.5-45.5' SAMPLE.</u> No recovery. Assumed weathered claystone.</p>	
105				
110				
115				
120				

LOG OF BOREHOLE

Location Rocky Flats Plant; East Trenches Area Borehole/Well No. 28-87BR
 Coordinates N 36442.31 E 24983.42 Ground Surface Elevation 5947.17'
 Total Depth 207.00' Water Level Encountered 17.7'
 Static _____
 Drilling Company Boyles Bros Driller R. Sharp; P. Bushkovski
 Date Drilled Sept. 3-9; Sept. 11-15, 1987 Helper S. Bradfield; K. Parker
 Drilling Method Hollow Stem Auger; Rotary Core Drilling Fluid 0.0-55.5': None
 Logged By J.B. Bergman; R.T. Treat Checked By 55.5'-207.0': Water
 Geologist _____ Site Manager _____

CEARP Manager

Comments Surface casing set to 55.5' by J.B. Bergman on September 8, 1987.

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
120			<u>45.5-47.0' SAMPLE.</u> Recovered 1.5/1.5' = 100%. CLAYSTONE: light gray (N 7/0) to medium gray (N 5/0); moderately cemented; massive; blocky; slightly Fe stained; weathered; moist.	
125			<u>47.0-49.0' SAMPLE.</u> Recovered 2.0/2.0' = 100%. CLAYSTONE: light gray (N 7/0); massive; slightly Fe stained; blocky; medium to highly plastic; weathered; moist.	
130			<u>49.0-50.5' SAMPLE.</u> Recovered 1.5/1.5' = 100%. 49.0-49.5': CLAYSTONE: light gray (N 7/0); massive; blocky; slightly Fe stained; weathered; medium plastic; moist. 49.5-50.5': CLAYSTONE (SHALE): dark gray (N 2/0); massive; only slightly Fe stained; medium plastic; blocky; moist to slightly moist.	
135			<u>50.5-52.0' SAMPLE.</u> Recovered 1.5/1.5' = 100%. CLAYSTONE (SHALE): medium dark gray (N 4/0) to dark gray (N 3/0); massive; blocky; only slightly Fe stained; moist.	
140			<u>52.0-53.5' SAMPLE.</u> Recovered 1.5/1.5' = 100%. CLAYSTONE (SHALE): same as above; moist.	

LOG OF BOREHOLE

Location Rocky Flats Plant; East Trenches Area Borehole/Well No. 28-87BR
 Coordinates N 36442.31 E 24983.42 Ground Surface Elevation 5947.17'
 Total Depth 207.00' Water Level Encountered 17.7'
 Static _____
 Drilling Company Boyles Bros Driller R. Sharp; P. Bushkovski
 Date Drilled Sept. 3-9; Sept. 11-15, 1987 Helper S. Bradfield; K. Parker
 Drilling Method Hollow Stem Auger; Rotary Core Drilling Fluid 0.0-55.5': None
 Logged By J.B. Bergman; R.T. Treat Checked By 55.5'-207.0': Water
 Geologist _____ Site Manager _____

CEARP Manager

Comments Surface casing set to 55.5' by J.B. Bergman on September 8, 1987.

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
140			<u>53.5-55.0' SAMPLE.</u> Recovered 1.5/1.5' = 100%. CLAYSTONE (SHALE): medium gray (N 5/0) to medium dark gray (N 4/0); massive; blocky; some slightly olive or Fe staining; moist.	
145			<u>56.0-60.0' SAMPLE.</u> Recovered 4.0/4.0' = 100%. RQD = 4.0/4.0' = 100%. CLAYSTONE (SHALE): medium gray (N 5/0); massive; medium plastic; blocky; trace fine-grained sand; moist.	
150			<u>60.0-62.0' SAMPLE.</u> Recovered 1.0/2.0' = 50%. RQD = 0.7/1.0' = 70%. CLAYSTONE (SHALE): same as above; moist.	
155			<u>62.0-65.5' SAMPLE.</u> Recovered 2.0/3.5' = 57%. RQD = 0.9/2.0' = 45%. CLAYSTONE (SHALE): medium dark gray (N 4/0); massive; blocky; medium plastic; moist.	
160			<u>65.5-70.0' SAMPLE.</u> Recovered 4.5/4.5' = 100%. RQD = 3.64/4.5' = 81%. CLAYSTONE (SHALE): dark gray (N 3/0) to medium gray (N 5/0); massive; low to medium plastic; moist.	

LOG OF BOREHOLE

Location Rocky Flats Plant; East Trenches Area Borehole/Well No. 28-87BR
 Coordinates N 36442.31 E 24983.42 Ground Surface Elevation 5947.17'
 Total Depth 207.00' Water Level Encountered 17.7'
 Static _____
 Drilling Company Boyles Bros Driller R. Sharp; P. Bushkovski
 Date Drilled Sept. 3-9; Sept. 11-15, 1987 Helper S. Bradfield; K. Parker
 Drilling Method Hollow Stem Auger; Rotary Core Drilling Fluid 0.0-55.5': None
 Logged By J.B. Bergman; R.T. Treat Checked By 55.5'-207.0': Water
 Geologist _____ Site Manager _____

CEARP Manager

Comments Surface casing set to 55.5' by J.B. Bergman on September 8, 1987.

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
160			<u>70.0-74.0' SAMPLE.</u> Recovered 4.0/4.0' = 100%. RQD = 2.65/4.0' = 66%. CLAYSTONE (SHALE): same as above; moist.	
165			<u>74.0-78.0' SAMPLE.</u> Recovered 2.84/4.0' = 71%. RQD = 1.60/2.84' = 56%. CLAYSTONE (SHALE): same as above; moist.	
170			<u>78.0-82.0' SAMPLE.</u> Recovered 4.0/4.0' = 100%. RQD = 4.0/4.0' = 100%. CLAYSTONE (SHALE): medium light gray (N 6/0); massive; blocky; medium plastic; moist.	
175			<u>82.0-86.0' SAMPLE.</u> Recovered 3.2/4.0' = 80%. RQD = 2.10/3.2' = 66%. CLAYSTONE (SHALE): same as above; moist.	
180			<u>86.0-90.0' SAMPLE.</u> Recovered 3.6/4.0' = 90%. RQD = 3.3/3.6' = 92%. CLAYSTONE (SHALE): dark gray (N 3/0) to grayish black (N 2/0); massive; blocky; moist.	
			<u>90.0-94.0' SAMPLE.</u> Recovered 3.7/4.0' = 93%. RQD = 3.35/3.7' = 91%. CLAYSTONE (SHALE): same as above; moist.	

LOG OF BOREHOLE

Location Rocky Flats Plant; East Trenches Area Borehole/Well No. 28-87BR
 Coordinates N 36442.31 E 24983.42 Ground Surface Elevation 5947.17'
 Total Depth 207.00' Water Level Encountered 17.7'
 Static _____
 Drilling Company Boyles Bros Driller R. Sharp; P. Bushkovski
 Date Drilled Sept. 3-9; Sept. 11-15, 1987 Helper S. Bradfield; K. Parker
 Drilling Method Hollow Stem Auger; Rotary Core Drilling Fluid 0.0-55.5': None
 Logged By J.B. Bergman; R.T. Treat Checked By 55.5'-207.0': Water
 Geologist _____ Site Manager _____

CEARP Manager

Comments Surface casing set to 55.5' by J.B. Bergman on September 8, 1987.

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
180			<u>94.0-98.0' SAMPLE.</u> Recovered 3.8/4.0' = 95%. RQD = 3.8/3.8' = 100%. CLAYSTONE (SHALE): medium light gray (N 6/0); some fine-grained sand; massive; moist.	
185			<u>98.0-102.0' SAMPLE.</u> Recovered 3.5/4.0' = 88%. RQD = 3.2/3.5' = 91%. CLAYEY SANDSTONE: light gray (N 7/0) to medium dark gray (N 4/0); fine-grained sand; moderately cemented; trace lignite; moist.	
190			<u>102.0-106.0' SAMPLE.</u> Recovered 4.5/4.0' = 112%. RQD = 4.5/4.5' = 100%. 102.0-105.2': SANDSTONE: medium gray (N 5/0) to medium dark gray (N 7/0); fine-grained sand; slightly clayey; moderately cemented; moist. 105.2-106.0': SANDY CLAYSTONE: same as above; moist.	
195			<u>106.0-110.0' SAMPLE.</u> Recovered 3.7/4.0' = 93%. RQD = 3.2/3.7' = 87%. 106.0-106.3': SANDY CLAYSTONE: same as above; moist. 106.3-110.0': SANDSTONE: medium gray (N 5/0) to medium dark gray (N 4/0); fine-grained sand; very clayey; weakly cemented; moist.	
200				

LOG OF BOREHOLE

Location Rocky Flats Plant; East Trenches Area Borehole/Well No. 28-87BR
 Coordinates N 36442.31 E 24983.42 Ground Surface Elevation 5947.17'
 Total Depth 207.00' Water Level Encountered 17.7'
 Static _____
 Drilling Company Boyles Bros Driller R. Sharp; P. Bushkovski
 Date Drilled Sept. 3-9; Sept. 11-15, 1987 Helper S. Bradfield; K. Parker
 Drilling Method Hollow Stem Auger; Rotary Core Drilling Fluid 0.0-55.5': None
 Logged By J.B. Bergman; R.T. Treat Checked By 55.5'-207.0': Water
 Geologist _____ Site Manager _____

CEARP Manager

Comments Surface casing set to 55.5' by J.B. Bergman on September 8, 1987.

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
200			<u>110.0-114.0' SAMPLE.</u> Recovered 3.4/4.0' = 85%. RQD = 2.5/3.4' = 74%. SANDSTONE: light gray (N 7/0) to medium gray (N 5/0); fine-grained sand; poorly sorted; moderately cemented; slightly clayey; massive; moist.	
205			<u>114.0-118.0' SAMPLE.</u> Recovered 4.0/4.0' = 100%. RQD = 3.8/4.0' = 95%. SANDSTONE: medium gray (N 5/0) to medium dark gray (N 4/0); very fine-grained sand; moderately cemented; massive; clay lenses to claystone at bottom; moist.	
210			<u>118.0-122.0' SAMPLE.</u> Recovered 3.7/4.0' = 93%. RQD = 3.1/3.7' = 84%. CLAYSTONE: medium gray (N 5/0); some very fine-grained sand; poorly sorted; massive; low plasticity; blocky; moist.	
			<u>122.0-126.0' SAMPLE.</u> Recovered 3.7/4.0' = 93%. RQD = 3.45/3.7' = 93%. CLAYSTONE: medium dark gray (N 4/0); massive; blocky; moist.	
			<u>126.0-130.0' SAMPLE.</u> Recovered 2.75/4.0' = 69%. RQD = 0%. CLAYSTONE (SHALE): same as above; moist.	

LOG OF BOREHOLE

Location Rocky Flats Plant; East Trenches Area Borehole/Well No. 28-87BR
 Coordinates N 36442.31 E 24983.42 Ground Surface Elevation 5947.17'
 Total Depth 207.00' Water Level Encountered 17.7'
 Static _____
 Drilling Company Boyles Bros Driller R. Sharp; P. Bushkovski
 Date Drilled Sept. 3-9; Sept. 11-15, 1987 Helper S. Bradfield; K. Parker
 Drilling Method Hollow Stem Auger; Rotary Core Drilling Fluid 0.0-55.5': None
 Logged By J.B. Bergman; R.T. Treat Checked By _____
 Geologist Site Manager

CEARP Manager

Comments Surface casing set to 55.5' by J.B. Bergman on September 8, 1987.

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			<u>130.0-134.0' SAMPLE.</u> Recovered 4.8/4.0' = 120%. RQD = 3.8/4.8' = 79%. CLAYSTONE (SHALE): medium dark gray (N 4/0) to grayish black (N 2/0); massive; low to medium plastic; blocky; moist.	
			<u>134.0-138.0' SAMPLE.</u> Recovered 2.65/4.0' = 66%. RQD = 2.3/2.65' = 87%. CLAYSTONE (SHALE): same as above; moist.	
			<u>138.0-142.0' SAMPLE.</u> Recovered 5.0/4.0' = 125%. RQD = 5.0/5.0' = 100%. CLAYSTONE (SHALE): same as above with very fine-grained sands; moist.	
			<u>142.0-146.0' SAMPLE.</u> Recovered 4.0/4.0' = 100%. RQD = 4.0/4.0' = 100%. 142.0-142.9': CLAYSTONE (SHALE): medium dark gray (N 4/0); some sand; massive; medium to low plastic; moist. 142.9-143.4': SANDSTONE: medium gray (N 5/0) to medium dark gray (N 4/0); fine-grained sands; moderately cemented; poorly sorted; moist.	

LOG OF BOREHOLE

Location Rocky Flats Plant; East Trenches Area Borehole/Well No. 28-87BR
 Coordinates N 36442.31 E 24983.42 Ground Surface Elevation 5947.17'
 Total Depth 207.00' Water Level Encountered 17.7'
 Drilling Company Boyles Bros Static _____
 Date Drilled Sept. 3-9; Sept. 11-15, 1987 Driller R. Sharp; P. Bushkovski
 Drilling Method Hollow Stem Auger; Rotary Core Helper S. Bradfield; K. Parker
 Logged By J.B. Bergman; R.T. Treat Drilling Fluid 0.0-55.5': None
 Geologist _____ 55.5'-207.0': Water [Signature]
 Checked By _____ Site Manager _____

CEARP Manager

Comments Surface casing set to 55.5' by J.B. Bergman on September 8, 1987.

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			<u>146.0-150.5' SAMPLE.</u> Recovered 4.5/4.5' = 100%. RQD = 3.7/4.5' = 82%. CLAYSTONE (SHALE): medium dark gray (N 4/0); massive; medium to low plastic; trace fine-grained sand; blocky; moist.	
			<u>150.5-154.5' SAMPLE.</u> Recovered 4.0/4.0' = 100%. RQD = 3.4/4.0' = 85%. CLAYSTONE: same as above; moist.	
			<u>154.5-159.0' SAMPLE.</u> Recovered 4.5/4.5' = 100%. RQD = 4.5/4.5' = 100%. CLAYSTONE: same as above; moist.	
			<u>159.0-163.0' SAMPLE.</u> Recovered 4.0/4.0' = 100%. RQD = 4.0/4.0' = 100%. CLAYSTONE: same as above; moist.	
			<u>163.0-166.0' SAMPLE.</u> Recovered 1.15/3.0' = 38%. RQD = 0.5/1.15' = 43%. CLAYSTONE: same as above; moist.	
			<u>166.0-168.0' SAMPLE.</u> Recovered 3.85/2.0' = 192%. RQD = 3.85/3.85' = 100%. CLAYSTONE: same as above; moist.	

LOG OF BOREHOLE

Location Rocky Flats Plant; East Trenches Area Borehole/Well No. 28-87BR
 Coordinates N 36442.31 E 24983.42 Ground Surface Elevation 5947.17'
 Total Depth 207.00' Water Level Encountered 17.7'
 Static _____
 Drilling Company Boyles Bros Driller R. Sharp; P. Bushkovski
 Date Drilled Sept. 3-9; Sept. 11-15, 1987 Helper S. Bradfield; K. Parker
 Drilling Method Hollow Stem Auger; Rotary Core Drilling Fluid 0.0-55.5': None
 Logged By J.B. Bergman; R.T. Treat Checked By 55.5'-207.0': Water
 Geologist _____ Site Manager _____

CEARP Manager

Comments Surface casing set to 55.5' by J.B. Bergman on September 8, 1987.

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			<u>168.0-172.0' SAMPLE.</u> Recovered 3.9/4.0' = 98%. RQD = 3.9/3.9' = 100%. CLAYSTONE (SHALE): medium dark gray (N 4/0) to medium gray (N 5/0); trace very fine-grained sand; massive; medium plastic; moist.	
			<u>172.0-176.0' SAMPLE.</u> Recovered 4.0/4.0' = 100%. RQD = 4.0/4.0' = 100%. CLAYSTONE (SHALE): same as above; moist.	
			<u>176.0-180.0' SAMPLE.</u> Recovered 4.0/4.0' = 100%. RQD = 3.7/4.0' = 93%. CLAYSTONE (SHALE): same as above; moist.	
			<u>180.0-184.0' SAMPLE.</u> Recovered 2.0/4.0' = 50%. RQD = 0%. CLAYSTONE (SHALE): same as above; moist.	
			<u>184.0-188.0' SAMPLE.</u> Recovered 3.9/4.0' = 98%. RQD = 3.4/3.9' = 77%. 184.0-187.3': CLAYSTONE (SHALE): same as above; moist. 187.3-188.0': SANDSTONE: medium light gray (N 6/0) to medium gray (N 5/0); fine-grained; trace clay; moderately cemented; moist.	

LOG OF BOREHOLE

Location Rocky Flats Plant; East Trenches Area Borehole/Well No. 28-87BR
 Coordinates N 36442.31 E 24983.42 Ground Surface Elevation 5947.17'
 Total Depth 207.00' Water Level Encountered 17.7'
 Static _____
 Drilling Company Boyles Bros Driller R. Sharp; P. Bushkovski
 Date Drilled Sept. 3-9; Sept. 11-15, 1987 Helper S. Bradfield; K. Parker
 Drilling Method Hollow Stem Auger; Rotary Core Drilling Fluid 0.0-55.5': None
 Logged By J.B. Bergman; R.T. Treat Checked By 55.5'-207.0': Water *[Signature]*
 Geologist Site Manager

CEARP Manager

Comments Surface casing set to 55.5' by J.B. Bergman on September 8, 1987.

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			<u>188.0-192.0' SAMPLE.</u> Recovered 3.8/4.0' = 95%. RQD = 2.3/3.8' = 61%. 188.0-191.3': SANDSTONE: light gray (N 7/0) to medium light gray (N 6/0); very fine-grained; highly cemented; slightly calcareous; massive; moist. 191.3-192.0': CLAYSTONE (SHALE): medium dark gray (N 4/0); some sand; blocky; medium plastic; moist.	
			<u>192.0-196.0' SAMPLE.</u> Recovered 4.0/4.0' = 100%. RQD = 3.35/4.0' = 84%. 192.0-194.9': CLAYSTONE: same as above except medium gray (N 5/0); moist. 194.9-196.0': SANDSTONE: medium gray (N 5/0); very fine-grained; poorly sorted; moderately cemented; moist.	
			<u>196.0-199.0' SAMPLE.</u> Recovered 3.5/4.0' = 88%. RQD = 2.25/3.5' = 64%. 196.0-197.2': SANDSTONE: same as above; moist. 197.2-199.0': CLAYSTONE (SHALE): dark gray (N 3/0); highly plastic; blocky; moist.	
			<u>199.0-202.0' SAMPLE.</u> Recovered 3.0/3.0' = 100%. RQD = 3.0/3.0' = 100%. CLAYSTONE (SHALE): same as above but some very fine-grained sand; moist.	

LOG OF BOREHOLE

Location Rocky Flats Plant; East Trenches Area Borehole/Well No. 28-87BR
 Coordinates N 36442.31 E 24983.42 Ground Surface Elevation 5947.17'
 Total Depth 207.00' Water Level Encountered 17.7'
 Static _____
 Drilling Company Boyles Bros Driller R. Sharp; P. Bushkovski
 Date Drilled Sept. 3-9; Sept. 11-15, 1987 Helper S. Bradfield; K. Parker
 Drilling Method Hollow Stem Auger; Rotary Core Drilling Fluid 0.0-55.5': None
 Logged By J.B. Bergman; R.T. Treat Checked By 55.5'-207.0': Water
 Geologist _____ Site Manager _____

CEARP Manager

Comments Surface casing set to 55.5' by J.B. Bergman on September 8, 1987.

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			<u>202.0-205.0' SAMPLE.</u> Recovered 3.0/3.0' = 100%. RQD = 3.0/3.0' = 100%. CLAYSTONE (SHALE): dark gray (N 3/0); trace very fine-grained sand; massive; medium plastic; moist.	
			<u>205.0-207.0' SAMPLE.</u> Recovered 2.0/2.0' = 100%. RQD = 2.0/2.0' = 100%. CLAYSTONE (SHALE): same as above; moist.	
			TOTAL DEPTH: 207.00'	

WELL COMPLETION INFORMATION

Location Rocky Flats Plant: East Trenches Area Well No. 28-87BR
 Coordinates N 36442.31 E 24983.42 Elevation: Ground Surface 5947.17'
 Total Depth: Well 197.70' Top of Casing 5950.03'
 Borehole 207.00'

Formation of Completion Arapahoe Formation

Casing Material Sch 5, type 316 TFJ stainless steel

Casing Diameter 2" ID

Screen Material 0.010" wire wrap, type 316 TFJ stainless steel

Surface Casing Diameter 5" ID

Date Installed Sept 21-23, 1987

Approved By [Signature]

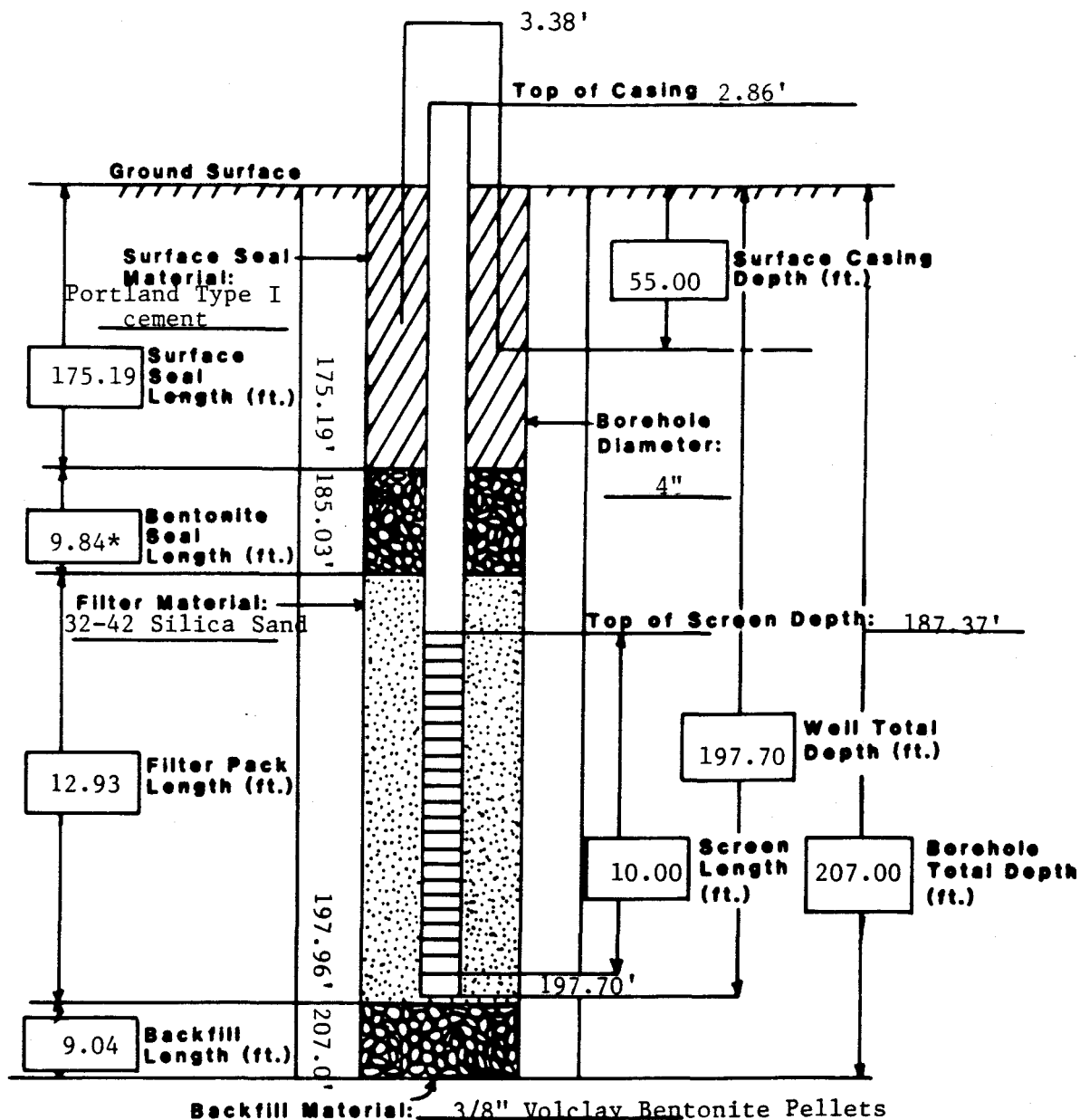
Installed By K.D. Holliday

Geologist

Site Manager

CEARP Manager

Comments Problem with sinking casing; solved by letting backfill sit overnight.
Possible caving in filter pack but above top of the screen, causing filter
pack to be higher in hole. Bentonite seal was adjusted to remain 3.0'
Possible caving in top part of bentonite seal causing seal to come higher in
the hole. Note: caving was caused by tripping tremie pipe downhole.



*See comments above

PACKER TEST ANALYSIS

WELL NO. 28-87BR

ROCKY FLATS PLANT; EAST TRENCHES

JOB NO. 2029-17-02

DATE TESTED: 9/17/87

BY: L.A. GREGORY-FROST

TEST INTERVAL (FEET BELOW G.S.): 57.35 - 67.00

MATERIAL TESTED: ARAPAHOE CLAYSTONE

DEPTH TO WATER (FEET BELOW G.S.): 193.23

$$K = \frac{Q}{2(\pi)(L)(H)} \ln\left(\frac{L}{R}\right)$$

1ST P1/3 TEST

Q = INJECTION RATE = .00386629 (FEET3/MIN)

L = LENGTH OF TEST INTERVAL = 9.65 FEET

TEST INTERVAL IS ABOVE WATER TABLE

HEAD = DEPTH OF CENTER OF INTERVAL + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)

= 62.17 + 10.14 + .00 * 2.31 = 72.32

R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .0000035798 FT/MIN

K = .00000182 CM/SEC

P2/3 TEST

Q = INJECTION RATE = .00100929 (FEET3/MIN)

L = LENGTH OF TEST INTERVAL = 9.65 FEET

TEST INTERVAL IS ABOVE WATER TABLE

HEAD = DEPTH OF CENTER OF INTERVAL + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)

= 62.17 + 5.63 + 11.50 * 2.31 = 94.37

R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .0000007161 FT/MIN

K = .00000036 CM/SEC

2ND P1/3 TEST

Q = INJECTION RATE = .00018101 (FEET3/MIN)

L = LENGTH OF TEST INTERVAL = 9.65 FEET

TEST INTERVAL IS ABOVE WATER TABLE

HEAD = DEPTH OF CENTER OF INTERVAL + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)

= 62.17 + 9.90 + .00 * 2.31 = 72.07

R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .0000001682 FT/MIN

K = .00000009 CM/SEC

PACKER TEST ANALYSIS

WELL NO. 28-87BR

ROCKY FLATS PLANT; EAST TRENCHES

JOB NO. 2029-17-02

DATE TESTED: 9/17/87

BY: L.A. GREGORY-FROST

TEST INTERVAL (FEET BELOW G.S.): 62.68 - 72.33

MATERIAL TESTED: ARAPAHOE CLAYSTONE

DEPTH TO WATER (FEET BELOW G.S.): 193.23

$$K = \frac{Q}{2(P_1)(L)(H)} \ln\left(\frac{L}{R}\right)$$

1ST P1/3 TEST

P2/3 TEST

Q = INJECTION RATE = .00081380 (FEET³/MIN)

L = LENGTH OF TEST INTERVAL = 9.65 FEET

TEST INTERVAL IS ABOVE WATER TABLE

HEAD = DEPTH OF CENTER OF INTERVAL + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)

= 67.51 + 5.63 + 12.50 * 2.31 = 102.01

R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .00000053 FT/MIN

K = .00000027 CM/SEC

2ND P1/3 TEST

PACKER TEST ANALYSIS

WELL NO. 28-87BR

ROCKY FLATS PLANT; EAST TRENCHES

JOB NO. 2029-17-02

DATE TESTED: 9/17/87

BY: L.A. GREGORY-FROST

TEST INTERVAL (FEET BELOW G.S.): 78.70 - 88.35

MATERIAL TESTED: ARAPAHOE CLAYSTONE

DEPTH TO WATER (FEET BELOW G.S.): 193.23

$$K = \frac{Q}{2(PI)(L)(H)} \ln\left(\frac{L}{R}\right)$$

1ST P1/3 TEST

P2/3 TEST

Q = INJECTION RATE = .00042717 (FEET³/MIN)

L = LENGTH OF TEST INTERVAL = 9.65 FEET

TEST INTERVAL IS ABOVE WATER TABLE

HEAD = DEPTH OF CENTER OF INTERVAL + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)

= 83.52 + 5.63 + 16.50 * 2.31 = 127.27

R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .0000002247 FT/MIN

K = .00000011 CM/SEC

2ND P1/3 TEST

Q = INJECTION RATE = .00013322 (FEET³/MIN)

L = LENGTH OF TEST INTERVAL = 9.65 FEET

TEST INTERVAL IS ABOVE WATER TABLE

HEAD = DEPTH OF CENTER OF INTERVAL + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)

= 83.52 + 9.90 + .00 * 2.31 = 93.42

R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .0000000955 FT/MIN

K = .00000005 CM/SEC

PACKER TEST ANALYSIS

WELL NO. 28-87BR

ROCKY FLATS PLANT; EAST TRENCH

JOB NO. 2029-17-02

DATE TESTED: 9/17/87

BY: L.A. GREGORY-FROST

TEST INTERVAL (FEET BELOW G.S.): 88.35 - 98.00

MATERIAL TESTED: ARAPAHOE CLAYSTONE

DEPTH TO WATER (FEET BELOW G.S.): 193.23

$$K = \frac{Q}{2(PI)(L)(H)} \ln\left(\frac{L}{R}\right)$$

1ST P1/3 TEST

P2/3 TEST

Q = INJECTION RATE = .00192880 (FEET3/MIN)

L = LENGTH OF TEST INTERVAL = 9.65 FEET

TEST INTERVAL IS ABOVE WATER TABLE

HEAD = DEPTH OF CENTER OF INTERVAL + GAGE HEIGHT

+ GAGE PRESSURE (IN FEET)

= 93.18 + 5.63 + 18.75 * 2.31 = 142.12

R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .0000009087 FT/MIN

K = .00000046 CM/SEC

2ND P1/3 TEST

Q = INJECTION RATE = .00006227 (FEET3/MIN)

L = LENGTH OF TEST INTERVAL = 9.65 FEET

TEST INTERVAL IS ABOVE WATER TABLE

HEAD = DEPTH OF CENTER OF INTERVAL + GAGE HEIGHT

+ GAGE PRESSURE (IN FEET)

= 93.18 + 10.02 + .00 * 2.31 = 103.20

R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .0000000404 FT/MIN

K = .00000002 CM/SEC

PACKER TEST ANALYSIS

WELL NO. 28-87BR

ROCKY FLATS PLANT; EAST TRENCHES

JOB NO. 2029-17-02

DATE TESTED: 9/17/87

BY: L.A. GREGORY-FROST

TEST INTERVAL (FEET BELOW G.S.): 98.00 - 107.65

MATERIAL TESTED: ARAPAHOE CLAYSTONE

DEPTH TO WATER (FEET BELOW G.S.): 193.23

$$K = \frac{Q}{2(\pi)(L)(H)} \ln\left(\frac{L}{R}\right)$$

1ST P1/3 TEST

P2/3 TEST

Q = INJECTION RATE = .00038808 (FEET³/MIN)

L = LENGTH OF TEST INTERVAL = 9.65 FEET

TEST INTERVAL IS ABOVE WATER TABLE

HEAD = DEPTH OF CENTER OF INTERVAL + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)

= 102.82 + 5.63 + 21.00 * 2.31 = 156.96

R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .00000017 FT/MIN

K = .00000008 CM/SEC

2ND P1/3 TEST

PACKER TEST ANALYSIS

WELL NO. 28-87BR

ROCKY FLATS PLANT; EAST TRENCH

JOB NO. 2029-17-02

DATE TESTED: 9/17/87

BY: L.A. GREGORY-FROST

TEST INTERVAL (FEET BELOW G.S.): 100.35 - 110.00

MATERIAL TESTED: ARAPAHOE CLAYSTONE

DEPTH TO WATER (FEET BELOW G.S.): 193.23

$$K = \frac{Q}{2(PI)(L)(H)} \ln\left(\frac{L}{R}\right)$$

1ST P1/3 TEST

P2/3 TEST

2ND P1/3 TEST

Q = INJECTION RATE = .00005068 (FEET³/MIN)

L = LENGTH OF TEST INTERVAL = 9.65 FEET

TEST INTERVAL IS ABOVE WATER TABLE

HEAD = DEPTH OF CENTER OF INTERVAL + GAGE HEIGHT

+ GAGE PRESSURE (IN FEET)

= 105.18 + 9.94 + .00 * 2.31 = 115.12

R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .0000000295 FT/MIN

K = .00000001 CM/SEC

PACKER TEST ANALYSIS

WELL NO. 28-87BR

ROCKY FLATS PLANT; EAST TRENCH

JOB NO. 2029-17-02

DATE TESTED: 9/16/87

BY: L.A. GREGORY-FROST

TEST INTERVAL (FEET BELOW G.S.): 183.39 - 193.04

MATERIAL TESTED: ARAPAHOE CLAYSTONE

DEPTH TO WATER (FEET BELOW G.S.): 193.23

$$K = \frac{Q}{2(\pi)(L)(H)} \ln\left(\frac{L}{R}\right)$$

1ST P1/3 TEST

Q = INJECTION RATE = .00007964 (FEET³/MIN)

L = LENGTH OF TEST INTERVAL = 9.65 FEET

TEST INTERVAL IS ABOVE WATER TABLE

HEAD = DEPTH OF CENTER OF INTERVAL + GAGE HEIGHT

+ GAGE PRESSURE (IN FEET)

= 188.21 + 9.29 + .00 * 2.31 = 197.50

R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .0000000270 FT/MIN

K = .00000001 CM/SEC

P2/3 TEST

PACKER TEST ANALYSIS

WELL NO. 28-87BR

ROCKY FLATS PLANT; EAST TRENCH

JOB NO. 2029-17-02

DATE TESTED: 9/16/87

BY: L.A. GREGORY-FROST

TEST INTERVAL (FEET BELOW G.S.): 185.39 - 195.04

MATERIAL TESTED: ARAPAHOE CLAYSTONE

DEPTH TO WATER (FEET BELOW G.S.): 193.23

$$K = \frac{Q}{2(PI)(L)(H)} \ln\left(\frac{L}{R}\right)$$

1ST P1/3 TEST

Q = INJECTION RATE = .00000290 (FEET³/MIN)

L = LENGTH OF TEST INTERVAL = 9.65 FEET

TEST INTERVAL IS ABOVE WATER TABLE

HEAD = DEPTH OF CENTER OF INTERVAL + GAGE HEIGHT

+ GAGE PRESSURE (IN FEET)

= 190.21 + 10.03 + .00 * 2.31 = 200.24

R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .0000000010 FT/MIN

K = .00000000 CM/SEC

P2/3 TEST

PACKER TEST ANALYSIS

WELL NO. 28-87BR

ROCKY FLATS PLANT; EAST TRENCH

JOB NO. 2029-17-02

DATE TESTED: 9/16/87

BY: L.A. GREGORY-FROST

TEST INTERVAL (FEET BELOW G.S.): 187.54 - 197.19

MATERIAL TESTED: ARAPAHOE SANDSTONE

DEPTH TO WATER (FEET BELOW G.S.): 193.23

$$K = \frac{Q}{2(\pi)(L)(H)} \ln\left(\frac{L}{R}\right)$$

1ST P1/3 TEST

Q = INJECTION RATE = .00005792 (FEET³/MIN)

L = LENGTH OF TEST INTERVAL = 9.65 FEET

TEST INTERVAL IS ABOVE WATER TABLE

HEAD = DEPTH OF CENTER OF INTERVAL + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)

= 192.36 + 9.50 + .00 * 2.31 = 201.86

R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .0000000192 FT/MIN

K = .00000001 CM/SEC

P2/3 TEST

PACKER TEST ANALYSIS

WELL NO. 28-87BR

ROCKY FLATS PLANT; EAST TRENCH

JOB NO. 2029-17-02

DATE TESTED: 9/16/87

BY: L.A. GREGORY-FROST

TEST INTERVAL (FEET BELOW G.S.): 183.37 - 193.02

MATERIAL TESTED: ARAPAHOE SANDSTONE

DEPTH TO WATER (FEET BELOW G.S.): 193.23

$$K = \frac{Q}{2(\pi)(L)(H)} \ln\left(\frac{L}{R}\right)$$

1ST P1/3 TEST

Q = INJECTION RATE = .00001086 (FEET³/MIN)

L = LENGTH OF TEST INTERVAL = 9.65 FEET

TEST INTERVAL IS ABOVE WATER TABLE

HEAD = DEPTH OF CENTER OF INTERVAL + GAGE HEIGHT

+ GAGE PRESSURE (IN FEET)

= 188.20 + 9.61 + .00 * 2.31 = 197.81

R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .0000000037 FT/MIN

K = .00000000 CM/SEC

P2/3 TEST

PACKER TEST ANALYSIS

WELL NO. 28-87BR

ROCKY FLATS PLANT; EAST TRENCH

JOB NO. 2029-17-02

DATE TESTED: 9/16/87

BY: L.A. GREGORY-FROST

TEST INTERVAL (FEET BELOW G.S.): 187.55 - 197.20

MATERIAL TESTED: ARAPAHOE SANDSTONE

DEPTH TO WATER (FEET BELOW G.S.): 193.23

$$K = \frac{Q}{2(\pi)(L)(H)} \ln\left(\frac{L}{R}\right)$$

1ST P1/3 TEST

Q = INJECTION RATE = .00034908 (FEET³/MIN)

L = LENGTH OF TEST INTERVAL = 9.65 FEET

TEST INTERVAL IS ABOVE WATER TABLE

HEAD = DEPTH OF CENTER OF INTERVAL + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)

= 192.38 + 10.07 + .00 * 2.31 = 202.45

R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .0000001155 FT/MIN

K = .00000006 CM/SEC

P2/3 TEST

PACKER TEST DATA SHEET

Job No.: 2029-17-02

Static Water Level: 193.23'

Location: Rocky Flats Plant; East Trenches Area

Date of Water Level: 10/26/87

Well No.: 28-87BR

Page 1 of 3

Borehole Diameter: 0.333'

Comments: Test intervals #1-6 failed 2/3 pressure test, improper packer seal. Test intervals #7,8, 13-15 were aborted due to poor seal on packers. Tests #9-12, 16 are invalid due to water gain in tube on first 1/3 pressure test.

Acrylic Tube Diameter: 0.1663'

Test Interval No.	Top of Test Interval	Bottom of Test Interval	Test Length (minutes)	Gage Pressure	Gage Height	Avg. H ₂ O Height	Gage Height + Avg. H ₂ O Height	Δh	Date of Test	Lithology	Geologist
1	187.55	197.2	14	0	5.63	4.44'	10.07	0.225	9/16/87	Kass	LAG
			-	42	5.63	N/A	5.63	-	9/16/87	Kass	LAG
			-	-	5.63	-	-	-	9/16/87	Kass	LAG
2	183.14	192.79	14	0	5.63	4.34'	9.97	-0.024	9/16/87	KCL	LAG
			-	41	5.63	-	-	-	9/16/87	KCL	LAG
			-	-	5/63	-	-	-	9/16/87	KCL	LAG
3	183.37	193.02	14	0	5.63	3.985	9.615	0.007	9/16/87	Kass/KCL	LAG
			-	40.5	5.63	-	-	-	9/16/87	Kass/KCL	LAG
			-	-	5.63	-	-	-	9/16/87	Kass/KCL	LAG
4	187.54	197.19	15	0	5.63	3.87	9.5	0.04	9/16/87	Kass/KCL	LAG
			-	-	5.63	-	-	-	9/16/87	Kass/KCL	LAG
			-	-	5.63	-	-	-	9/16/87	Kass/KCL	LAG
5	185.39	195.04	15	0	5.63	4.54	10.03	0.002	9/16/87	KCL	LAG
			-	42	5.63	-	-	-	9/16/87	KCL	LAG
			-	-	5.63	-	-	-	9/16/87	KCL	LAG
6	183.39	193.04	15	0	5.63	3.66	9.29	0.055	9/16/87	KCL	LAG
			-	41.5	5.63	-	-	-	9/16/87	KCL	LAG
			-	-	5.63	-	-	-	9/16/87	KCL	LAG

PACKER TEST DATA SHEET

Job No.: 2029-17-02 Static Water Level: 193.23'
 Location: Rocky Flats Plant; East Trenches Area
 Well No.: 28-87BR (CON'T) Date of Water Level: 10/26/87
 Borehole Diameter: 0.333' Page 2 of 3
 Acrylic Tube Diameter: 0.1663'
 Comments: _____

Test Interval No.	Top of Test Interval	Bottom of Test Interval	Test Length (minutes)	Gage Pressure	Gage Height	Avg. H ₂ O Height	Gage Height + Avg. H ₂ O Height	Δh	Date of Test	Lithology	Geologist
7	180.61	190.26	Aborted	-	5.63	-	-	-	9/16/87	KCL	LAG
			Aborted	-	5.63	-	-	-	9/16/87	KCL	LAG
			Aborted	-	5.63	-	-	-	9/16/87	KCL	LAG
8	178.61	188.26	Aborted	-	5.63	-	-	-	9/16/87	KCL	LAG
			Aborted	-	5.63	-	-	-	9/16/87	KCL	LAG
			Aborted	-	5.63	-	-	-	9/16/87	KCL	LAG
9	100.35	110.00	15	0	5.63	3.89	9.52	-0.033	9/17/87	KCL	LAG
			15	21.5	5.63	N/A	5.63	-0.587	9/17/87	KCL	LAG
			15	0	5.63	4.311	9.94	0.035	9/17/87	KCL	LAG
10	98.0	107.65	15	0	5.63	4.05	9.68	-0.055	9/17/87	KCL	LAG
			15	21	5.63	N/A	5.63	0.268	9/17/87	KCL	LAG
			15	0	5.63	4.02	9.65	-0.010	9/17/87	KCL	LAG
11	88.35	98.0	15	0	5.63	4.03	9.66	-0.192	9/17/87	KCL	LAG
			15	18.75	5.63	N/A	5.63	1.332	9/17/87	KCL	LAG
			15	0	5.63	4.39	10.02	0.043	9/17/87	KCL	LAG
12	78.70	88.35	15	0	5.63	4.29	9.92	-0.037	9/17/87	KCL	LAG
			15	16.5	5.63	N/A	5.63	0.295	9/17/87	KCL	LAG
			15	0	5.63	4.27	9.90	0.092	9/17/87	KCL	LAG

PACKER TEST DATA SHEET

Job No.: 2029-17-02

Location: Rocky Flats Plant; East Trenches Area

Well No.: 28-87BR. (CON'T)

Baseball Diameter: 0.333"

Acrylic Tube Diameter: 0.1663'

Comments:

Static Water Level: 193.23'

Date of Water Level: 10/26/87

Page 3 of 3[illegible]